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ABSTRACT

Presented is the experimental edition of Unit III: Energy Relationships in My Environment, which consists of 25 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Five to eight activities for each of the four core study areas within Unit III are given of which the following are examples: growing plants, chemical energy, measuring energy values, the food chain game, and the green machine. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The four cores consider an introduction to energy, energy in food, energy flow through food chains and webs, and food making in plants. The ecological theme developed is the complementarity of organisms and environment. Inquiry skills seen to be developed are comparing and translating. Two problem solving skills emphasized are explaining and defending. The environmental element considered is energy. A desired behavior outcome is recognition of the child's dependence on his biological environment. (For related curriculum guides see EC 050 871 through EC 050 873 and EC 050 875.) (DB)

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Me and My Environment

Experimental Edition 1972 - 1973

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Unit III:
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Biological Sciences Curriculum Study

Life Sciences: A Special Education Program

Unit III: Energy Relationships in My Environment

1972-1973

Me and my Environment

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Me and my· Environment

INTRODUCTION

The project to develop a life science curriculum for the educable mentally handicapped (EMH) was originally funded in the summer of 1969 by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project is charged with writing, field testing, evaluating, and disseminating materials dealing with topics in life sciences for the EMH population in our schools.

ME NOW, the BSCS model life science program for educable mentally handicapped youngsters in the 11- through 13-year age-group, has been released and is available from Hubbard Scientific Company of Northbrook, Illinois.

On the basis of the success of the ME NOW program, and in anticipation of meeting further student and instructor needs, the Bureau of Education for the Handicapped has provided the BSCS with a three-year continuation grant to develop model materials for 13- to 15-year-old EMH students. Recognition by the educational community of the need for special emphasis on matters of ecological concern led the BSCS staff to decide early in the project that a

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Summer, 1971 - Initial writing conference

1971-72 academic year - Initial testing

Summer, 1972 - Revision

1972-73 academic year - Large-scale

Summer, 1973 - Revision

1973-74 academic year - Conclusi

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portion of the materials for EMH students should focus on environmental studies. The time line for developing this new curriculum, which is entitled ME AND MY ENVIRONMENT, is shown below.

In May 1971, a planning conference was held to prepare guidelines for the development of ME AND MY ENVIRONMENT. The conference was attended by the five members of the advisory committee, four of whom are in the field of special education and the fifth is in biology; the project writing team consisting of five special education teachers and five biology teachers; and the BSCS project staff. Conferees developed guidelines covering areas of environmental concern and utility for the target population of children, the characteristics of this population, and the needs of these children that might be met through environmental studies. A multidimensional model incorporating the science content, cognitive and affective behaviors, ecological themes, contextual focus, and needs of the children resulted from the planning conference. Following the conference, the BSCS project staff prepared a proposed content and objective outline for the curriculum. A thorough study was made of the existing literature covering the physical, social, and psychological needs of handicapped adults; the staff then attempted to identify which of those needs might be met by ME AND MY ENVIRONMENT.

Summer, 1971 - Initial writing conference

1971-72 academic year - Initial testing

Summer, 1972 - Revision

1972-73 academic year - Large-scale field test

Summer, 1973 - Revision

1973-74 academic year - Conclusion of field test

Me and my Environment

THE ROLE OF THE TEACHER IN THIS EXPERIMENTAL EDITION

This curriculum has been written by teachers; it will be tested and modified by teachers. BSCS has att enthusiastic teachers for this development, testing, and modification. Ten of these teachers served as more were selected as experimental teachers to provide the best possible initial field test of the curr feedback for the revision depends heavily upon the resourcefulness of these teachers. This means that including:

1. Implementing the strategies and activities exactly as they have been written. Only when the combin curriculum as prescribed are analyzed can its strengths and weaknesses be revealed.

2. Developing a feel for the inquiry strategy, flow of activities, and ultimate student behaviors arou this understanding of the rationale of this program, the test teachers must suggest extensions of s invent yet others as needed that would enable their students to achieve the objectives when the spe

3. Providing timely, accurate, and detailed feedback specifying strengths and weaknesses, modification activity.

4. Contributing to the actual writing of the curriculum in a few of the open-ended situations. We pur at spots where we have given you the opportunity to develop a portion of an activity in depth. Not but it will enable us to identify potential writers among the group of test teachers.

The following outline will provide you with an overview of the major components of the program:

	Ecological Themes	Inquiry Skills	Problem Solving Skills	Env E
UNIT I. EXPLORING MY ENVIRONMENT	Interrelationships Of Environmental Components	Observing	Experimenting	Space
Sensing My Environment Investigating My Environment Landmarks In My Environment		Identifying	Knowing What The Problem Is And What To Do To Solve It	Shelt

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ill be tested and modified by teachers. BSCS has attempted to find highly skilled, flexible, and
g, and modification. Ten of these teachers served as writers to create the materials. Fourteen
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ow of activities, and ultimate student behaviors around which the curriculum is organized. Through
ogram, the test teachers must suggest extensions of some activities, modifications of others, and
their students to achieve the objectives when the specified strategies are inadequate.

ack specifying strengths and weaknesses, modifications, alternatives, and student responses for each

iculum in a few of the open-ended situations. We purposely have provided blank pages in the manual
ty to develop a portion of an activity in depth. Not only will this give ideas to the future writers,
iters among the group of test teachers.

rview of the major components of the program:

s	Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
f ents	Observing	Experimenting	Space	The student develops:
	Identifying	Knowing What The Problem Is And What To Do To Solve It	Shelter	--a sense of self-identity. --a success syndrome. --an attitude of inquiry.

Me and my Environment

	Ecological Themes	Inquiry Skills	Problem Solving Skills	Er
UNIT II. ME AS A HABITAT Microbes And Me Disease In People Habitats Environmental Choices And Chances (Drugs, Alcohol, Smoking)	Diversity And Pattern	Associating	Recording Data	
		Describing	Discussion And Treatment Of Group Data	Liv (((
UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT Introduction To Energy Energy In Food Energy Flow Through Food Chains And Webs Food Making In Plants	Complementarity Of Organisms And Environment	Comparing	Organizing Data	
		Translating	Explaining, Defending, Answering Why Questions	
	Flow Of Energy	Inferring	Asking Questions	Ene (
		Applying	Identifying Variables	
UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT Energy And Material Transfer Decomposers In My Environment Garbage And My Environment	Cyclic Nature Of Processes	Guessing	Identifying Controls	Air
			Interpreting Results	
			Drawing Conclusions	

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s	Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
rn	Associating	Recording Data		--skills in functional, receptive, and expressive communication about his environment.
	Describing	Discussion And Treatment Of Group Data	Living Things (Plants) (Animals) (Microorganisms)	--skills in re nizing environmental landmarks and utilizing these for orientation and mobility.
n-	Comparing	Organizing Data		--a recognition of his social dependence on others and his biological dependence on the environment.
	Translating	Explaining, Defending, Answering Why Questions	Energy (Food Chains)	--an understanding of the interrelationships between environmental components.
	Inferring	Asking Questions		--skills in employing systematic problem-solving techniques to persistent problems of daily life.
	Applying	Identifying Variables	Air	--skills in hygienic personal body care.
	Guessing	Identifying Controls		--skills in the selection, preparation, and storage of food.
		Interpreting Results		
		Drawing Conclusions		

x

Me and my Environment

	Ecological Themes	Inquiry Skills	Problem Solving Skills	Envi El
UNIT V. POPULATIONS AND SOCIETIES	Finiteness Of Resources	Speculating	Recognizing Problems And Formulating Questions	Water
Behavior Within Different Social Levels		Predicting		
Population Size And Complexity			Designing Experiments	Man
Behavior And Population Density	Population Dynamics			
Population Size And Resource Use				
Population Growth				
	Ecological Trade-Off			

SOME GENERAL OBJECTIVES

1. To help the mentally handicapped child develop interests, skills, and positive attitudes through experiences with scientific -- especially biological -- concepts.

2. To provide the mentally handicapped child with challenging intellectual activity at a level commensurate with his ability to respond effectively.

3. To aid the child i heightened observa measure of self-co for his environmen

4. To contribute to t social maturity an

BSCS

s	Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
rces	Speculating	Recognizing Problems And Formulating Questions	Water	--an attitude of self-concern, as well as social concern, related to his environment.
	Predicting	Designing Experiments	Man	--skills in making independent decisions that relate to the quality of his environment.
				--a feeling of competence in dealing with his environment.
				--a basis for aesthetic appreciation.
f				--skill that may lead to a hobby or avocation over a lifetime.
				--an attitude about and concern for overcrowding and its social and personal implications.

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3. To aid the child in establishing functional modes of living through heightened observation, a well-developed curiosity, an increased measure of self-confidence, and a sense of responsibility to and for his environment.

4. To contribute to the development in the child of a higher level of social maturity and emotional stability that can lead to increased

vocational proficiency, realistic self-concept, creative self-expression, and more effective assimilation into the community.

5. To develop in the child a knowledge of himself in relation to his environment, along with a tendency to apply this knowledge to the tasks of everyday living.

6. To contribute to increased knowledge about the learning characteristics and limitations of the educable mentally handicapped pupil, and about effective strategies for instruction.

BASIC ASSUMPTIONS UNDERLYING THE DESIGN FOR THE CURRICULUM MATERIALS

In the initial discussions with the special education community, some basic assumptions for the development of the life science materials were identified. These were revised somewhat, based on the development and testing of ME NOW, to form the underlying assumptions for the development of ME AND MY ENVIRONMENT.

1. Ideas must be developed with a minimum of reading on the part of the student.

2. Vocabulary, where possible, should involve functional rather than technical language, although technical names are taught when these may be useful to the student.

3. Entry points should be concerned with concrete, tangible "things," rather than with abstract, intangible ideas or concepts.

4. The classroom environment and the materials should not be cluttered with distractors; however, a variety of perceptual modes and instructional media should be used (e.g., sight, touch, smell, etc.).

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5. Activities should be developed in small, discrete units that build on or reinforce - concept or skill.

6. Learning, for the EMH student, requires slower pacing, greater redundancy, and time for participation by each student. The instructional materials should be student-doing rather than student-watching.

7. An activity must involve the student in ways of applying the desired behavior; transfer cannot be assumed.

8. EMH children need and can respond effectively to an activity-oriented instructional approach.

9. The curriculum should be designed to provide students with an experience in science as inquiry, through the exploration of their environment.

10. Most teachers of the Educable Mentally Handicapped will need specific directions in using inquiry strategies for teaching science concepts.

11. The teachers of the Educable Mentally Handicapped, for the most part, are not science-oriented; therefore, the materials should be specific with regard to science techniques.

12. The materials and methods must allow for attention to individual differences and to specific learning characteristics of the population.

13. To achieve the objectives, designers of the materials should attempt to create a balance between detail and motivation; that is, the amount of minute and abstract detail that can be learned is probably a function of the interest and motivation that can be established to deal with it.

Me and my Environment

MAJOR AIMS FOR ME AND MY ENVIRONMENT, A JUNIOR HIGH EMH SCIENCE CURRICULUM

The curriculum includes instruction related to the personal well-being, self-worth, confidence, and successful coping of each person to meet persistent daily life problems. The major aims are:

1. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather on a passive compliance or an impulsive response to problems.

2. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

The curriculum is intended to be intellectually stimulating, and exploratory for each student, and to induce him to become actively involved. It should encourage the following outcome:

3. Development in each child of an interest that could become a hobby or avocation over a lifetime (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

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The curriculum is organized around eight ecological themes. There are some specific content objectives related to these. The ultimate objectives are:

4. Development in each child of a sense of relationship and empathy with other living things. It is hoped this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

5. Development in each child of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

These are the five overriding aims that should serve as reference points for teachers and guide much of what they plan and do in the classroom. A junior high student in one of the first classes that tested these materials expressed what is needed this way: "I just feel that if we want these kids to improve, and that's the whole idea of it, you have to bring these kids a certain amount of happiness. You have got to make them feel that they are really wanted. If they are wanted, they will try a little harder. That sounds kind of childish, I suppose, but it works...Another thing...always inspire: 'Come on, put your best foot down -- try it again.' You know, things like that. I mean, to me, just the tone of voice makes a difference to me about going out or staying in this class. I just feel that they don't want me -- And they don't, (when their tone says) 'Oh, Eddie! Why did he have to come today?'"

ECOLOGICAL THEMES

Since the original planning conference for the development of ME AND MY ENVIRONMENT, eight ecological themes have emerged which seem to encompass the major ideas and concepts (i.e., the science content) that the curriculum development team sees as appropriate for this student population. These themes are broad generalizations, some understanding of which appears to be a prerequisite for coping with

one's own environment as well as with society's environmental problems. The themes are probably best thought of as unifying threads which run throughout the curriculum.

1. INTERRELATIONSHIPS OF ENVIRONMENTAL COMPONENTS.

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." -John Muir

Life is entirely dependent upon the things that the environment supplies: air, water, food, shelter, and subtle things such as a suitable temperature and humidity. Animals depend upon other animals or plants for food. Scavengers (carrion and detritus feeders) and decomposers (bacteria and fungi) obtain their nutrition from the remains of living organisms. Green plants depend upon sunlight, air, water, and minerals from their environment and form the base upon which all organisms are interconnected by food chains and complex food webs.

Organisms interact with each other, and with the environment, in a variety of ways in addition to the eater-eaten relationships of food chains or webs. Plants compete with each other for light, water, soil nutrients, and growing space. Animals compete for available food resources, space, and shelter. Other relationships include parasite-host and pathogen-host interactions.

The important consequence of this theme is that actions are not singular, nor do they have singular impact. Man's competitive interactions have far-reaching, often unknown consequences. For example, clearing land for raising agricultural crops destroys the habitat for plants and animals and disrupts certain food webs, while establishing suitable habitat for agricultural species. The resulting monocultures are often vulnerable to attack by pests because populations

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of natural predators have been removed. Attempts to control these competitive organisms through applications of pesticides may simply exacerbate the situation by killing nontarget organisms such as predators, scavengers, and decomposers which are actually beneficial. Similarly, herbicides used in control of weeds which are competing with crops may destroy habitats for natural predators, making additional applications of insecticides necessary; these in turn may kill more nontarget beneficial organisms. Numerous studies have shown that large-scale, indiscriminate use of pesticides may, in the long run, actually decrease agricultural productivity. In addition, manufacture, transport, and application of pesticides and fertilizers contribute to air and water pollution, thereby adding to the degradation of vital resources upon which all life depends. This is but one simple example of a myriad possibilities. If we expect students to start thinking in terms of consequences, it is imperative that they realize and appreciate that life depends upon interrelationships and that apparently simple actions may have far-reaching implications.

2. DIVERSITY AND PATTERN.

There is great diversity in the environment. Differences in climate and topography generate different environments made up of different communities of plants and animals. Plants and animals differ as they are adapted to perform different functions. Even within a species there is diversity. But, it is possible to find patterns within that diversity. Recognizing patterns helps one conceptualize and understand the functioning and interrelationships of all environmental elements within the biosphere.

If one looks at the organisms in any habitat, he discovers a variety of sizes, shapes, and colors. Further examination will reveal groups of organisms that are related in various ways, e.g. some produce food (producers) while others feed upon these producers (consumers). We

find that the organisms are all related in a pattern forming a food web.

Diversity is thought to enhance the stability of a system, for it provides alternate channels of energy or materials flow if part of the system is lost or overburdened. For example, consider a single food chain: plants, grasshoppers, frogs, snakes. If one link in the chain is lost, e.g. the grasshoppers are wiped out by insecticides, all links beyond that one will also be lost if they have no alternative sources of food. In a complex food web, however, a link may be lost without destroying the system; links beyond the missing one may turn to another channel for food (e.g., the frogs may exploit another type of insect food resource). Thus, preserving diversity may be necessary in preserving the stability of the life support system of the biosphere. Man cannot exist alone.

It is often said that variety is the spice of life. Diversity makes the environment less monotonous and more interesting. This aesthetic component should receive emphasis in the curriculum.

3. COMPLEMENTARITY OF ORGANISMS AND ENVIRONMENT.

A complement is something that completes or fills out something. Complementarity in this context refers to the completion brought about by interrelationships which are dependent upon one another. A few examples should clarify the meaning of this theme.

Organisms use material things from the environment and, in turn recycle things to the environment which may be used by other organisms. Thus, the presence of organisms modifies the environment in various ways, some of which make the environment more suitable for other organisms. Plants use carbon dioxide and release more oxygen than they use. Consumer

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organisms (animals, decomposers) use oxygen and release carbon dioxide. Both the producers and consumers are dependent upon the environment for these resources, and the balance of these materials in the environment is likewise dependent upon both groups of organisms.

Without scavengers and decomposers there would be a prodigious accumulation of the remains of once living organisms cluttering up the environment. Probably all of the available carbon, oxygen, and other essential elements would be tied up in these dead remains. Life would have come to a screeching halt a long time ago!

The presence of plants improves the water-holding capacity of a watershed and helps prevent erosion of the soil by wind and water. Plants reduce the rate of evaporation of soil water but at the same time release it to the atmosphere. Thus, plants play a vital role in the water cycle and influence local climates through the regulated flow.

Plant succession is a classic example of complementarity. An abandoned field, new roadside, or similar disturbed area is quickly invaded by hardy pioneer plants which we usually think of as weeds. As these grow, die, and decay, they modify the immediate environment and are replaced by plants which are better adapted to the new conditions. These, in turn, cause further modifications and are replaced by other populations; finally a relatively stable community exists that is able to replace itself and that is in dynamic equilibrium with the environment. Such communities are usually referred to as climax communities.

4. FLOW OF ENERGY

"The biotic stream is capable of flowing in long or short circuits, rapidly or slowly, uniformly or in spurts, in declining or ascending volume. Ecology calls this sequence of stages in the transmission of energy a food chain, but it

can be more accurately envisioned as a pipe line---(which) leaks at every joint." -Aldo Leopold.

Energy may be defined as the capacity to do work. To cause movement requires energy; indeed, to do anything requires energy. Life depends upon this continuous flow which is initiated by a constant input of energy from the sun, its photosynthetic transformation from light to chemical energy by the producer organisms (green plants), its passage from organism to organism along various food chains, and its eventual loss as radiant heat to outer space. Each time that energy is converted or transformed at each step along the way, some of it is lost from the system and is no longer available to do useful work. This, in simple terms, is the second law of thermodynamics. Green plants are able to fix photosynthetically only a portion of the sun's energy that they intercept. In turn, some of the energy which they trap and store is used by the plants for such things as growth, reproduction, and the movement of materials. Thus, only a portion of that original stored energy is available to the organisms which eat the plants. These organisms likewise use energy in their various life processes so that only a small portion of the energy which they received from eating plants is available to their predators. As a consequence, only about one-tenth of the energy at any step in a food chain is available to the next level. An acre of agricultural land will provide enough food energy for about 1.5 persons for a year if planted in wheat, but will feed only 0.1 person if used to raise beef cattle!

Society's use of fossil fuels is simply a utilization of energy captured and stored over millions of years by green plants. As such, this source of energy is in finite supply and is a nonrenewable resource. Electricity generated by fossil-fuel burning plants can similarly be traced to the sun. Hydroelectric plants offer a limited

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alternative source of electricity. This source is also finite because of the limited number of adequate sites. The use of nuclear reactors (which is simply a duplication on earth of the natural processes taking place on the sun to release energy) to generate electricity offers an alternative source of energy for society; this source, however, as are all others, is governed by the laws of thermodynamics. The energy, once released, flows through the system and is eventually lost to space as heat. This source is also finite, but refinements in the technology of the breeder reactor may make it a very large source. The exploitation of nuclear energy is fraught with unanswered questions and problems. How can we safely dispose of the radioactive wastes generated? Can the earth dissipate the huge amounts of waste heat generated? What effects will this heat have on climates, ecosystems, organisms?

It should be emphasized that nuclear energy offers little hope, at present, of replacing the sun as a life-supporting source of energy. In the forseeable future, man's only source of food energy will be the sun, through photosynthesis of green plants.

5. CYCLIC NATURE OF PROCESSES.

"All the rivers run into the sea, yet the sea is not full."
-King Solomon

In contrast to energy, materials (matter) are continuously cycled from living to nonliving systems. Materials necessary for life are in finite supply, and if they were not constantly cycled, life would simply run out of resources and cease. Some examples include the water cycle, the carbon dioxide-oxygen cycle, the nitrogen cycle, and the cycling of various essential minerals such as calcium, potassium, sulfur, and magnesium. Decomposer organisms play a most vital role in many of these cycles, releasing materials which have been incorporated into living organisms so that they are once again available to other organisms in the environment.

Me and my Environment

Man's present exploitation of consumable resources, in most cases, upsets these natural cycles. The manufacture and ultimate discarding of nonbiodegradable products removes important elements and compounds from the natural cyclic processes of the ecosphere and could ultimately lead to the exhaustion of such resources for the life support system. Burning of fossil fuels is changing the natural balance of oxygen and carbon dioxide in the atmosphere, with the consequences largely unknown. Degradation of air and water through pollution and the application of pesticides destroys organisms which are vital to cyclic processes.

6. FINITENESS OF RESOURCES.

To paraphrase Barry Commoner: Everything has to come from somewhere. The earth has been likened to a spaceship because of its finite supply of all material resources. Inasmuch as life depends upon a continued supply of resources, things have to be used over and over. Continued exploitation of any resource will lead to its exhaustion unless that resource is recycled. The demands of today's technological societies are placing tremendous burdens on the earth's resources and, at the same time, the wastes generated are making other resources unavailable or unfit for supporting life. Projections indicate that we will have depleted our supply of fossil fuels and several important metals resources early in the next century.

Through photosynthesis, food is a renewable resource so long as the natural cycles are able to resupply the raw materials necessary, and so long as environmental conditions necessary for plant life are maintained. But, the amount of food that can be produced on the earth at any one time is finite! There is only so much area available, only so much sunlight that can be intercepted, and only so much of the required raw materials available.

The consequence of this theme is that an indefinite continuation of growth and an increasing use of resources is impossible when the supply

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of all resources is finite. This is true of population, food consumption, resource utilization, technology, gross national product, or any other parameter which one chooses to measure. And all noteworthy predictions indicate that we are very rapidly reaching the limits of growth. Most of us will probably experience the dire consequences!

7. POPULATION DYNAMICS.

A population refers to a collection of individuals of the same species occupying a given space at a given time. The size of living populations is determined by four factors: rate of birth, rate of death, rate of immigration, and rate of emigration. Populations tend to grow geometrically (e.g., 2, 4, 8, 16, 32,...) to the limit (carrying capacity) of their environment as determined by the available food, space, predation, and disease. They then either level off and exist in some fluctuating equilibrium with other populations, or they crash back to some low level. A common misconception is that all biological populations tend to follow the first pattern: growth which is described by an S-shaped curve up to the carrying capacity, followed by a fluctuating equilibrium. There are, however, many biological populations which dramatically overshoot the carrying capacity of their environment and, as resources are rapidly depleted, crash back to a low population level. A blowfly population is a good example of the latter. Upon arrival at a carcass, the population increases rapidly, completely overshooting the carrying capacity or the environment's capacity to sustain the population for any appreciable length of time. As the food resource is quickly depleted, the population crashes back to the low level of a few adult flies who are searching out a new carcass to feed upon.

The strategy is simple -- exploit the environment for all it's worth while it is here and hope that a few of the many adults produced in the process will survive long enough to make it to the next carcass. There is evidence that the characteristics of human population growth are similar to those described for the blowfly, and our present exploitation of the earth's resources is certainly analogous to the strategy employed

by the blowfly. While such a strategy may be sound for organisms like the blowfly, it certainly would be disastrous for mankind. The earth is the only carcass that we have.

Since resources are finite, no population can continue to grow forever. The human population has grown geometrically over the past few centuries. Doubling time of the human population is currently less than 35 years, and the most optimistic estimates indicate that this population will exceed the carrying capacity of earth within a century (some suggest that we have already passed the carrying capacity and many demographers and ecologists have predicted a crash in the human population prior to the year 2020). Population control and zero population growth will be accomplished, either by self-imposed means or by natural means. If the latter, it will occur through starvation, disease, war, or lower fecundity. There are no other plausible alternatives!

Perhaps the greatest service that this curriculum could hope to perform is to help this population of youngsters understand the implications of population growth and the necessity for limiting family size. But, to achieve the desired end, the curriculum must provide the students with an understanding of the ways and means by which family size may be controlled. This is one area where individuals can make decisions, can have an influence, and can contribute to the solution of what may be mankind's most pressing problem!

8. ECOLOGICAL TRADE-OFFS.

"Every coin has two sides."

As we have seen, all environmental components are interrelated in intricate, complex ways. No action has singular impact, and thus any course of action must be carefully weighed and alternatives considered. Any course of action involves ecological trade-offs.

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For example, consider society's use of electricity. Many of us enjoy a life style which is very closely tied to the conveniences and labor-saving devices powered by electricity. The generation of that electricity is a major factor in environmental degradation. By and large, we have made the decision to forego a certain amount of environmental quality to enjoy the leisure and convenience of electrical appliances. Projections indicate that increases in demand for electrical power will require strip mining vast areas of Wyoming and Montana, exploiting oil shale reserves of Colorado, depleting the petroleum reserves of the Alaskan north slope (with the inherent dangers to the arctic tundra), and constructing large numbers of nuclear power plants. In all of these activities, we will trade off various amounts of environmental quality.

INQUIRY PHILOSOPHY

We do not view science as a collection of facts, but as a process by which facts are gathered, interpreted, and organized into conceptual schemes. We have included facts, and activities structured to generate facts, not for their intrinsic value but to provide the means through which concepts and generalizations are developed through an inquiry strategy.

Inquiry, simply defined, is finding out why. Inquiry may be defined as a process of questioning, of seeking information, of discovering. For EMH students, as for others, the excitement of discovery adds meaning to learning. Inquiry allows the student a natural avenue for satisfying his curiosity about his world. An inquiry strategy is one which poses a question or problem and then guides students through inquiring kinds of behaviors such as observing, describing, identifying, comparing, associating, inferring, applying, predicting, translating, guessing, speculating, creative thinking (divergent production), and value judging.

There are degrees of inquiry. On one end of the scale, a question is posed and the student, after analyzing the question and applying his

experiences and background information, answers the question. At the other extreme, the student poses the question after being given a certain amount of background information, and then proceeds to answer the question after being given a certain amount of background information, and then proceeds to answer the question by designing an experiment, conducting the experiment, and interpreting the results.

All degrees of inquiry have a common ingredient: the answer is not given; it is arrived at by the individual after he has analyzed information relevant to the question. The distinction is obvious -- in inquiry strategies the questions are answered by the students and not the instructor.

If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use that strategy in acquiring further information and solving future problems as they arise.

It is assumed that after completion of the curriculum, the student will ask questions that emerge through the interaction of environmental inputs with the experiences we have provided. He will be more able to seek answers to these questions through his ability to acquire and interpret information.

INQUIRY SKILLS

1. OBSERVING is a fundamental activity of scientists. The accumulation of information which may lead to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of this curriculum should be to offer a rich and varied environment of concrete experiences for the students. As students gain experience, accuracy in observing and recording the details of their findings should be increased. Observing should frequently include an eleme to heed all of t can. Opinion, i course, a part o

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include an element of divergent production by asking the students to heed all of the details, extraneous and otherwise, that they can. Opinion, interpretation, and speculation are not, of course, a part of observing.

2. IDENTIFYING involves the recognition of what something is or of certain properties that make it possible to categorize the thing. This includes the determination and/or matching of a name or definition, the use of a key or guide, or the recall of a label from previous experience.

3. ASSOCIATING involves seeing what things go together -- seeing relationships or recognizing common properties. Associating may be thought of as a prerequisite to classifying, or organizing data or information for some purpose. Grouping (classifying), through associating, may enhance conceptualizing.

4. DESCRIBING involves writing or verbalizing orally all of the relevant observations about a thing so that another individual would be able to use the description to identify the object or share in an event he did not actually experience. Emphasizing description should enhance development of observational skills.

5. COMPARING involves the inspection of two or more objects (events) to note similarities and differences. It is closely related to the student's ability to distinguish between critical differences and to generalize recognizible similarities. This skill could involve the use of referents other than the things compared. It is necessary that one have an understanding of such comparatives as hotter-colder and smaller-larger, as well as a comprehension of their related values, e.g., warmer-cooler and littler-bigger.

6. TRANSLATING is the skill in which recorded observations (data) are expressed in another symbolic form. The conversion of tabular

information into a graph or of a verbal description into a drawing exemplifies this.

7. INFERRING involves drawing a conclusion based on evidence. It requires going beyond the information at hand to describe an effect or answer a question. It involves extrapolation and implication, and is closely related to two of the problem-solving skills: interpreting results and drawing conclusions.

8. APPLYING involves the utilization of a learned task or skill in some other situation than that in which the task or skill was originally learned. For example, if a child has learned to orient the top of one map with north, an application would be to orient another map in a similar manner.

9. GUESSING is the generation of ideas about outcomes in a data-poor situation. It involves using one's common sense and hunches to make the most informed judgment one can.

10. SPECULATING is the process of generating ideas about the nature or outcome of something one has not had the opportunity to observe, but about which one can think based on past experiences. It may be that a great deal is known about the subject, but without having observed it, one must describe the event from imagination.

11. PREDICTING is the skill of making informed estimates of what should happen in a given situation, based on knowledge of what enters into the situation and previous experience.

12. DIVERGENT PRODUCTION refers to the process of generating as many ideas about something as possible.

13. VALUE JUDGING involves more than simply expressing opinions or preferences. It is the comparison of things and the assignment of relative value to them, based upon some set of criteria. In this curriculum, the WHY of valuing should be sought.

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PROBLEM SOLVING SKILLS

Inquiry is finding out WHY. The process of finding the answers to WHY is problem solving. The ME AND MY ENVIRONMENT science curriculum is a structured sequence of activities that enable the student, through success, to learn to seek the answers to WHY. It is hoped that the experiences provided in the curriculum will enable the student to face and solve the problems of everyday life, both now and later.

There are at least three levels of mastery of problem solving skills. The minimum level is an awareness of the skill. The second level is the functional ability to perform it. The highest level includes the capability of designing an original experiment and carrying it to completion. It should be borne in mind that problem solving behavior is a complex package involving past experience, motivation, cognitive development, etc. The development of problem solving skills should be closely related to the appropriate inquiry skills, concepts, and other organizers of the curriculum.

A brief description of the intended interpretation of the problem solving skills follows in what we consider to be a hierarchy of easiest to most difficult.

1. EXPERIMENTING is doing something to see what happens. It is having the opportunity to "mess around" with a given piece of apparatus or set of materials, to pursue individual curiosity or interest, to explore, and to find things out.

   Some examples of experimenting include: investigating the properties of environmental objects (e.g., which ones will float, which ones can be burned, which are man-made, etc.), having the opportunity to use thermometers or balances, raising a classroom pet or plants, burning things under a pinwheel, having time to experiment with the balances, etc.

It is important to distinguish between experimenting as we have defined it and the formal aspects of experiment and experimental design. Note that the formal aspects are dealt with as a separate category and that designing experiments is thought to be the most difficult of the problem solving skills.

To encourage development of this skill, instructions such as "ALLOW STUDENTS TO MANIPULATE AND EXPERIMENT WITH THE BALANCES," "CAPITALIZE ON STUDENT INTEREST BY ALLOWING STUDENTS TO OBSERVE AND HANDLE THE PETS," etc., are given to the teacher.

2. KNOWING what the problem is and what to do to solve it. Defining the problem and its parts clearly is an important first step in any problem solving situation. We assume that recognition and definition of a problem represents a difficult task for this student population, and has therefore been placed high in the problem solving skill hierarchy. The purpose of this skill is to assist students through many experiences in recognizing that a problem exists, in defining that problem, and understanding how answers to that problem might be obtained. This skill must be emphasized (that is, the problem made explicit) for the logical development of those skills which follow. Here we are concerned that the student know the question under investigation and clearly understand the methods to be used in attempting to answer that question. The materials should emphasize, for both teachers and students, that science is a process of finding answers to questions. There is a subtle difference between telling the student the answer to the question he is investigating (e.g., "To see if it is warmer in the sun or in the shade") as opposed to making it clear what the task focus is (e.g., "To see if there are differences in the temperature of different parts of the environment, and if so, see if we can discover what makes the temperature different in different places").

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3. RECORDING DATA questions of science are answerable through observation and collection of data pertinent to the question. Recording of observations is a necessary skill to enable the investigator to recall the observations and discuss and interpret them in view of the question. Included here is the collection and transcription of information called for by the question. Making sketches, notes, taking pictures, recording sounds, recording measurements, etc., are included.

4. DISCUSSION AND TREATMENT OF GROUP DATA -- COMPARING RESULTS A look at the outcomes of each student's or student group's investigation and a discussion of why one result may differ from another should emphasize the dynamics of group discussion and dialog rather than recitation and monolog. Discussion of variability of results should assist students in the identification of variables which may influence outcomes. The ability to express or talk about what was done is involved here, with students operating primarily at the observing, identifying, describing, and comparing levels of cognition. Discussion of individual or group results provides the teacher with an opportunity to assess student understanding of the investigation and to recognize possibilities for further investigation, alternative activities to re-emphasize particular concepts, or review.

5. ORGANIZING DATA The ordering and grouping of recorded information makes it easier to interpret and see relationships. Included in this category are tabulation of data, averaging or deciding on best estimates, any visual representation such as line or bar graphs, and pictures or schematic representations. This is the most difficult skill directly related to data for students to become proficient in. Organizing data often involves the inquiry skill of translating information into a different symbolic form.

Me and my Environment

6. EXPLAINING, DEFENDING, ANSWERING WHY QUESTIONS This involves discussion of a more sophisticated level than that previously considered. Explaining should assist in the development of the idea of cause and effect. It implies the students' understanding of the question, the procedures, and some ability to interpret results. Defending encourages confidence in one's procedures and interpretation of outcomes. Answering why questions requires an understanding of the questions and task as well as forcing students to analyze data and make interpretations. In the activity Food For Sleep, such questions as "WHERE DID THE HEAT ENERGY COME FROM?" "HOW DO YOU KNOW?" and "WHY ARE YOU TAKING THE TEMPERATURE OF ALL THREE CONTAINERS?" fall into this category. To answer such questions, the students are often operating at the inference level of cognition.

   Specific examples of such questions are included in the guide. It seems particularly appropriate for the teacher to be asking individuals or groups these kinds of questions as they proceed with an investigation. We need to emphasize, by providing questioning strategies, that discussion of this sort with individuals and small groups is an effective method of instruction which provides immediate feedback to the teacher.

7. ASKING QUESTIONS This category refers to student questions which are raised as a result of their observations, experiences, and experimenting. Teachers are given examples of the kinds of questions that students may raise and suggestions of how such questions should be dealt with.

8. IDENTIFYING VARIABLES Identification of those variables which may influence the outcome of an investigation is necessary if one is to understand the concept of a controlled experiment, if one is to make any sort of an appraisal of the design of an e
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9. IDENTIFYING CONTROLS Once the students are able to identify variables that may influence an outcome, the idea that all variables except the one under investigation must be held constant can be developed.

10. INTERPRETING RESULTS This is perhaps the most important of the problem solving skills, and may be the most difficult to develop. Explicit models for teachers and students are provided. They deal with the data collected and interpret it in terms of the question asked. Emphasis is placed on recognizing the limitations of data and that the data may or may not have answered the question; not going beyond the data; and recognizing the need for further investigation. Teachers are cautioned to avoid the temptation of ignoring the data and simply providing "the answer."

11. DRAWING CONCLUSIONS Interpretation of results may warrant drawing conclusions. The emphasis here is on drawing only those conclusions that are supported by the data collected. Some forced conclusions are inevitable because of the difficulty of providing experimental evidence; however, great care is exercised to avoid forced conclusions when an experiment is conducted and data gathered.

12. RECOGNIZING PROBLEMS AND FORMULATING QUESTIONS This skill is a necessary prerequisite for the general application of the other problem solving skills outside the classroom situation. In other

words, if we expect students to apply the problem solving skills above to their daily problems, it seems necessary that they be able to recognize that a problem exists and be able to state an appropriate question. To develop this skill, the students are presented with events or phenomenon that present an identifiable problem, and then given the opportunity to define that problem.

13. DESIGNING EXPERIMENTS Once the students are able to recognize a problem and formulate a question, an experiment to answer that question may be designed. The design should include identification of variables and controls, methods for observation, gathering data, organizing and presenting data, etc. It is assumed that this student population will be able to perform this skill only after a great deal of experience with the preceding skills.

SPECIFYING STRATEGIES FOR INSTRUCTION

The model for inquiry used in these materials demands that the focus of classroom activity be on student involvement with materials and activities. The teacher functions as a catalyst in generating pupil response in the learning situation. The response desired may be attitudinal, cognitive, or psychomotor: verbal or nonverbal. The teacher's behavior also falls in these same categories, but with an important difference: the teacher must be totally conscious of his role as a stimulus, while the student is generally unaware that he is being manipulated by strategy.

To communicate maximally with the teacher, we feel we must carefully describe as much as possible of the pattern of interaction upon which the anticipated results depend. The whole intent of this curriculum would be defeated if this pattern is not understood and implemented. We know, for example, that teachers often fail to allow children the opportunity or the time to think for themselves when a problem is

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posed. They also frequently impose their observations and interpretations of things on children rather than allow the children to express their own views of things observed. We hope, therefore, to provide for teachers a model of strategy in these materials that will -- if initially studied and used -- demonstrate the benefits we describe for it in terms of pupil response behavior.

We do not anticipate that we can predict all that will occur with individual students in the classroom. We hope that we can, however, provide enough reminders to the teacher so that he will deal with unexpected or unpredicted events in the same mode in which the materials are written.

LEVELS OF OBJECTIVE STATEMENTS

UNIT GOALS

Unit goals are broad general statements that define long-term goals of a major portion of the unit. An initial statement, "The student will," is understood in each of the goals. They are defined as statements that capture the intent and emphasis of the curriculum. They also serve the function of organizers toward which the core objectives are directed.

CORE OBJECTIVES

The core objectives (stated in student behaviors) refer to the desired outcomes for sequences of activities. The role of these objectives is to summarize what the student will be able to do as a consequence of each of the activity sequences. The core objectives provide a cognitive map for the teacher to extend or elaborate on. These core objectives may also serve as evaluative guides to assess short-term progress and attainment of students.

Me and my Environment

ACTIVITY OBJECTIVES

Activity objectives are enabling or performance objectives that relate to the specific activity. They identify the actions or behaviors students must perform or acquire to insure their success in achieving the broader objectives of the curriculum. The role of the activity objective is to provide the teacher with specific instructional landmarks both to plot the course and to chart student progress. The objectives include information which the student has repeated or restated, experiences he has had, actions he has performed, and products he has made.

ANTICIPATED STUDENT RESPONSE BEHAVIORS

These focus on specific *actions or interactions occurring during instruction*. They describe what we predict students will do or say in response to some specific strategy.

TEACHING THE MATERIALS

It is often said that man is a curious animal and that science is a content vehicle to capitalize on this phenomenon.

Science, then, for the EMH student, capitalizes on the student's natural curiosity about himself. Science is exciting, and ME AND MY ENVIRONMENT relies on this excitement. This science program has been designed to fit into the already existing curriculum framework and within individual teaching philosophies.

The amount of time spent on each activity can be tailored to fit the mood of the class and the teacher. An averate of 45 minutes may be required for all activities. Some activities will require extensive time, perhaps several days. The main point in teaching ME AND MY ENVIRONMENT is not to hurry -- to allow sufficient time for inquiry to occur.

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The ME AND MY ENVIRONMENT sequence may span three years, or it may take less time. The pace can be set by the individual teacher.

Particular attention has been given to articulating the science curriculum with the other parts of the instructional program. Sight vocabulary is included in many of the activities, and suggestions given for using these words in spelling and vocabulary lessons. Math skills are an integral part of science, and the lessons provide application of the student's math skills.

PLANNING GUIDE

Teaching the materials for the first time will require preparation time. Less preparation time is required after that. The teacher's planning guide will help you prepare materials in advance. For example, if a film is to be ordered, the planning guide will remind you when. The guide should be followed rather rigidly when initiating an activity.

OVERVIEWS

Each UNIT and CORE is provided with a summary "roadmap" to give the teacher an insight into the direction or groupings of activities.

RATIONALE

Each UNIT and CORE is provided with a section to provide background into the why of the particular material used. These rationales should be read, thought about, and continually referred back to in order for you to focus on and subsequently provide *why intentionality* to your students.

Me and my Environment

BACKGROUND INFORMATION

Some pertinent points which are not necessarily developed in the curriculum itself but which will provide you with useful information have been incorporated in this section at the beginning of each CORE.

REVIEWS TO SUCCESS AND CLUES TO SUCCESS

A portion of the evaluation program during the first field testing of ME AND MY ENVIRONMENT entailed the use of what was basically an objective pretest, administered on the days before beginning instruction on each unit, and an identical posttest administered the days following completion of each unit. The items included in each test were specifically designed to secure information on the students' background knowledge as well as to secure data about the success of the materials. They were not used to evaluate the youngsters.

Because the item designs for use with this student population proved highly effective, many of these questions, along with some situational tasks, have been incorporated into two *instructional assessment sections*. The first of these, "Clues to Success," appears periodically within various activities so that you can have immediate feedback on the effectiveness of the materials and instruction. At this point you have the unique opportunity to determine whether or not your students are ready for the next activity or whether a modification, repetition, extension, or review of certain activities is necessary before proceeding.

The "Reviews to Success" are generally concluding activities in a CORE. They enable you to assess the effectiveness of instruction for the entire CORE and to decide if the students are prepared for the next set of objectives.

WORKSHEETS

The worksheets in the program are used in a variety of ways: a) as reinforcement to general or specific objectives; b) to introduce new information and to
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new information and to record data; c) to enhance the interest in an activity; d) as a culminating activity to review what has been covered in previous lessons. Difficult worksheets are duplicated on daylight slides. These worksheets should be demonstrated on the chalkboard before they are attempted by the individual students.

35mm SLIDES

This medium broadens instructional opportunities, especially during inquiry activities. The projected image should be used both by the teacher and by most students during instruction. The teaching strategies give specific instructions for using them.

You need not completely darken your classroom when using the slides. Your students should be able to write or read at their desks or move from their desks to the board while the slides are being shown. It will be desirable, however, to turn off those lights or darken those windows where the light is reflected directly from the chalkboard.

The largest possible image is usually best for the students to see clearly. Therefore, place the slide projector as far as possible from the chalkboard, but so that the image projected does not extend above or below the edges of the board.

It is expected that students and teachers will often use chalk to mark directly on the projected image.

Be sure that you are familiar with the operating instructions for the Carousel Projector and that you observe the manufacturer's cautions for insertion and projection of slides, trays, bulbs, and lenses.

GAMES

Perhaps the most ambitious of the endeavors has been to promote certain objectives through the use of games and game theory. Besides providing

variation to the instructional mode, the games are used to dramatize some of the major concepts in the curriculum, as well as to give experience in cooperation and taking turns.

BOOKLETS

This medium is used as a variation to the worksheets and 35mm slides. It combines a minimum of reading with cartooned illustrations to present somewhat detailed factual information.

POLAROID CAMERA

To increase the opportunities for involving all students in the activities, a Polaroid camera has been included as part of the instructional materials. The camera is provided through the courtesy of the Polaroid Corporation.

A camera in the classroom can serve as a valuable motivation device for students, as well as a help in prolonging their ever-so-short interest span. The instant feedback from the pictures is a replay of the actual class activity, a photographic record that can be used to compare before and after conditions, a progress report of growth and development, or an assessment of the learning that took place in an activity. Actually operating the camera, manipulating parts, focusing, developing, and viewing the finished product affords an ego-building experience. Such experiences will help the student develop self-esteem and self-confidence, thus contributing to the development of a success syndrome.

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Me and my Environment

MATERIALS

Camera (Polaroid Square Shooter)
Polaroid film
Flash cubes
*Masking tape
*Yardstick
*Marking devices
*Clock with second hand
Worksheet 0
*Foot ruler

TEACHING STRATEGIES

Floating Activity. Meet The Camera

Most students will not know how to operate the Square Shooter Camera. A good understanding now of how it works is essential to the successful use of the camera in subsequent activities.

Begin by saying:

MANY OF OUR CLASS ACTIVITIES THIS YEAR WILL REQUIRE TAKING PICTURES. HOW MANY OF YOU HAVE EVER USED A CAMERA?

Then ask:

DO YOU KNOW WHAT KIND OF CAMERA THIS IS? (Holding up camera.)

If yes, then ask:

HAVE YOU TAKEN A PICTURE WITH A CAMERA LIKE THIS?

If a student has operated a Polaroid Camera previously, select that student to assist you with the activity.

Say:

THIS CAMERA IS CALLED A POLAROID SQUARE SHOOTER. IT MAKES PICTURES THAT YOU CAN

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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
tivity. Meet The Camera	*At the end of this activity, each student should:*
ts will not know how to operate the Square era. A good understanding now of how it sential to the successful use of the camera nt activities.	*--have become familiar with the distance of 3 1/2 feet, 5 feet, and 10 feet.* *--have participated in identifying parts of the camera.* *--have counted time in seconds.* *--have operated the camera in taking a picture.* *--have developed a picture.*
ying:	Students:
F OUR CLASS ACTIVITIES THIS YEAR WILL E TAKING PICTURES. HOW MANY OF YOU VER USED A CAMERA?	--respond by show of hands.
KNOW WHAT KIND OF CAMERA THIS IS? ng up camera.)	--respond, "Yes," "No," "Don't know."
n ask:	
OU TAKEN A PICTURE WITH A CAMERA HIS?	--respond, "Yes," "No."
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MATERIALS	TEACHING STRATEGIES
	SEE IN ONE MINUTE AFTER THEY ARE TAKEN. THROUGHOUT THE YEAR YOU WILL BE USING IT TO TAKE PICTURES OF CLASS ACTIVITIES AND EACH OF YOU WILL HAVE A CHANCE TO OPERATE IT MANY TIMES. At this point have students gather around the camera to get a closer look and examine it in order to become more familiar with it. When students are seated once again, distribute Worksheet 0 of camera parts. Show and tell about the parts of the camera while the students find them on Worksheet 0. Write the name of the part on the chalkboard as you discuss it. Have pupils say the name. Continue until you have mentioned all parts essential to their first effort. Say: NOW THAT WE HAVE SEEN ALL THE PARTS OF THE CAMERA WHAT ELSE DO YOU THINK WE NEED TO KNOW IN ORDER TO WORK THE CAMERA WELL ENOUGH TO GET GOOD PICTURES? If no one implies that it is important to know the distance of the object, then say: IN ORDER TO GET A CLEAR PICTURE WE MUST KNOW HOW FAR THE OBJECT IS FROM THE CAMERA, AND THEN ADJUST THE CAMERA TO TAKE A PICTURE. Refer to Distance Scale on Lens Ring. Say: THIS IS THE PART THAT SHOWS WHICH DISTANCES THE CAMERA CAN ADJUST TO FOR CLEAR PICTURES. 3 1/2 FEET, 5 FEET, 10 FEET, ETC.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
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THE PART THAT SHOWS WHICH DISTANCES ERA CAN ADJUST TO FOR CLEAR PICTURES. EET, 5 FEET, 10 FEET, ETC.	

MATERIALS	TEACHING STRATEGIES
	Show a foot ruler. Ask students to identify it. Say: LET'S MARK A DISTANCE THAT IS 3 1/2 FEET LONG ON THE FLOOR SO WE CAN TELL HOW FAR THAT DISTANCE IS WHEN WE'RE TAKING A PICTURE. Select a volunteer to assist you in marking off the distance with a foot ruler. Use a piece of masking tape to mark the distance. Reiterate how the ruler is placed end to end to get the distance. Have students search around the room for objects that are approximately 3 1/2 feet long or that are a distance of 3 1/2 feet away from the next object. Repeat this procedure for 5 feet and 10 feet. Allow plenty of time for students to associate one distance at a time with objects in the classroom. While one-half of the class continues to familiarize themselves with distances, organize the other half to take turns looking through the view finder on the camera to become acquainted with the black line and red arrow inside. Allow them time to practice taking pictures without shaking the camera (refer to position, page 3 in the camera manual). When everyone in this group has peered through the view finder and practiced holding the camera steady, switch groups and provide the same experience for the other half of the class. At a point when all pupils have tried the camera and determined distances, refer to the camera Worksheet 0 once again -- this time the back view.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ot ruler. Ask students to identify it.	Students: --respond, "A ruler," "A stick," "I don't know."
S MARK A DISTANCE THAT IS 3 1/2 FEET LONG HE FLOOR SO WE CAN TELL HOW FAR THAT ANCE IS WHEN WE'RE TAKING A PICTURE. volunteer to assist you in marking off the with a foot ruler. Use a piece of masking ark the distance. Reiterate how the ruler is d to end to get the distance. ents search around the room for objects that are tely 3 1/2 feet long or that are a distance of t away from the next object. Repeat this for 5 feet and 10 feet. Allow plenty of students to associate one distance at a time cts in the classroom.	--approximate distance and lengths of 3 1/2 feet, 5 feet, and 10 feet.
-half of the class continues to familiarize s with distances, organize the other half to s looking through the view finder on the become acquainted with the black line and inside. Allow them time to practice taking without shaking the camera (refer to position, the camera manual). one in this group has peered through the view l practiced holding the camera steady, switch l provide the same experience for the other half ss. when all pupils have tried the camera and l distances, refer to the camera Worksheet 0 -- this time the back view.	--look through the view finder. --practice judging distance.

MATERIALS	TEACHING STRATEGIES
	Say: WE ARE NOW READY TO PUT FILM IN THE CAMERA. (Identify and discuss only the parts the students need to use in loading the camera.) Say: (Student's name), WOULD YOU LIKE TO HELP ME LOAD THE CAMERA? Follow instructions on HOW TO LOAD FILM on pages 10 and 11 of the camera manual. Have the student fit the film pack on the camera, close and lock the back. Since pictures require a specific amount of time to develop, it will probably be necessary at this point to conduct a session on telling time by the second hand. Say: AFTER A PICTURE IS TAKEN, THE FILM REQUIRES 60 SECONDS TO DEVELOP. LET'S SEE IF WE CAN GET AN IDEA OF HOW LONG THAT IS. Direct the students' attention to the second hand on the clock, preferably a wall clock so that all may see at the same time. Point out the second hand and tell them to watch it go around the clock a few times. Say: NOW WE ARE GOING TO COUNT THE AMOUNT OF TIME IT TAKES THE SECOND HAND TO GO FROM 12 BACK TO 12. I WILL TELL YOU WHEN TO START COUNTING.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
NOW READY TO PUT FILM IN THE CAMERA. fy and discuss only the parts the students use in loading the camera.)	
t's name), WOULD YOU LIKE TO HELP ME E CAMERA?	--assist with loading the camera.
uctions on HOW TO LOAD FILM on pages 10 e camera manual. dent fit the film pack on the camera, ck the back. es require a specific amount of time to will probably be necessary at this point session on telling time by the second hand.	
PICTURE IS TAKEN, THE FILM REQUIRES NDS TO DEVELOP. LET'S SEE IF WE CAN IDEA OF HOW LONG THAT IS. tudents' attention to the second hand on the rably a wall clock so that all may see at e. Point out the second hand and tell them go around the clock a few times.	--observe second hand on clock.
ARE GOING TO COUNT THE AMOUNT OF TIME S THE SECOND HAND TO GO FROM 12 BACK TO WILL TELL YOU WHEN TO START COUNTING.	

MATERIALS	TEACHING STRATEGIES
	When the second hand approaches 12, signal the class to start counting the seconds softly. When the hand returns to 12 say: STOP. WHAT NUMBER WERE YOU SAYING WHEN I SAID STOP? Then say: IT TOOK 60 SECONDS FOR THE HAND TO GO ALL AROUND THE CLOCK. IT ALSO TAKES 60 SECONDS FOR THE FILM TO DEVELOP. LET'S TRY COUNTING THE SECONDS AGAIN, THIS TIME GOING FROM 3 BACK TO 3. Repeat the previous procedure. Say: NOW WE ARE READY TO TAKE OUR FIRST PICTURE. Arrange class for a group picture. When the picture is taken, pull film out of camera and have the class count off the 60 seconds of developing time. Peel off the film. Say: AS YOU PEEL OFF THE FILM FROM THE PICTURES YOU TAKE, BE CAREFUL OF A JELLYLIKE CHEMICAL ON THE FILM. IT IS IMPORTANT TO KEEP THIS JELLY AWAY FROM YOUR EYES AND MOUTH, AND ALSO AWAY FROM YOUR CLOTHES. Demonstrate how to fold up the negative. Now proudly show your product to the class. Say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
second hand approaches 12, signal the class to nting the seconds softly. When the hand returns : . WHAT NUMBER WERE YOU SAYING WHEN I SAID ? OOK 60 SECONDS FOR THE HAND TO GO ALL ND THE CLOCK. IT ALSO TAKES 60 SECONDS THE FILM TO DEVELOP. LET'S TRY COUNTING SECONDS AGAIN, THIS TIME GOING FROM 3 TO 3. e previous procedure. WE ARE READY TO TAKE OUR FIRST PICTURE. lass for a group picture. When the picture is 1 film out of camera and have the class count 0 seconds of developing time. Peel off the OU PEEL OFF THE FILM FROM THE PICTURES YOU BE CAREFUL OF A JELLYLIKE CHEMICAL ON THE IT IS IMPORTANT TO KEEP THIS JELLY AWAY YOUR EYES AND MOUTH, AND ALSO AWAY FROM YOUR HES. e how to fold up the negative. Now proudly show ct to the class.	Students: --respond, "60," "I forgot."

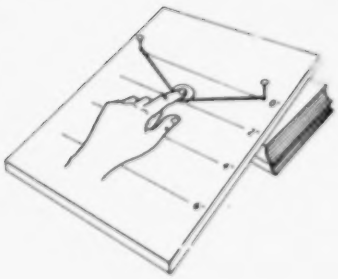
MATERIALS	TEACHING STRATEGIES
	NOW IT IS TIME FOR YOU TO TAKE A PICTURE. Follow the developing procedures on pages 18 and 19 of the camera manual. Say: THE PICTURE YOU TAKE MAY INCLUDE EITHER ONE OR TWO CLASSMATES. Organize the class for taking pictures. Assist students only when absolutely necessary. Let the picture taking continue until each student has had an opportunity to take a picture. Let students choose the classmate whose picture he wishes to take. Heap praise on students for any accomplishments. If a student's photo fails to turn out well, analyze the problem and allow him to try again. Mention use of flash cubes at the time needed. As students succeed in taking a good picture give them a gummed label to stick on the back. Each label should include the teacher's name, date, who is in the picture, and what the picture is about. In the comments section identify who took the picture. Make clear that it is the photographer's responsibility to see that every picture he takes is labeled. (He may need to get assistance from you or a classmate.)

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
IS TIME FOR YOU TO TAKE A PICTURE. veloping procedures on pages 18 and 19 of anual. TURE YOU TAKE MAY INCLUDE EITHER ONE CLASSMATES. class for taking pictures. Assist students solutely necessary. ure taking continue until each student has had y to take a picture. Let students choose whose picture he wishes to take. on students for any accomplishments. If a oto fails to turn out well, analyze the allow him to try again. of flash cubes at the time needed. succeed in taking a good picture give them a to stick on the back. Each label should teacher's name, date, who is in the picture, picture is about. In the comments section took the picture. Make clear that it is the 's responsibility to see that every picture he eled. (He may need to get assistance from ssmate.)	Students: --take pictures of classmates.

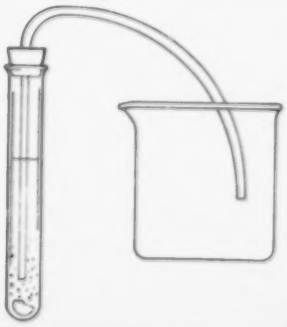
Me and my Environment

ENERGY RELA
IN MY ENVIR

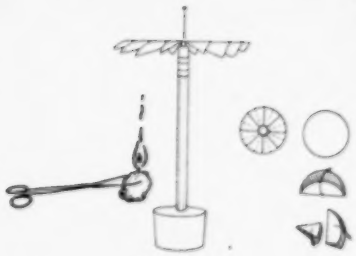
Core A



INTRODUCTION TO ENERGY



Core B



ENERGY IN FOOD

Core C

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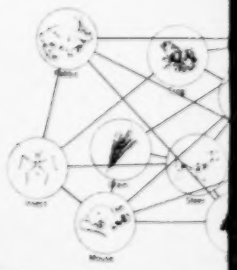
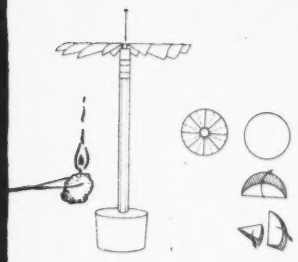
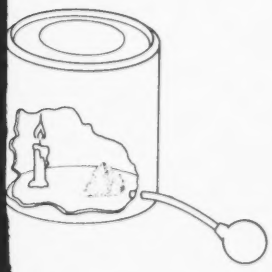


ENERGY RELATIONSHIPS IN MY ENVIRONMENT

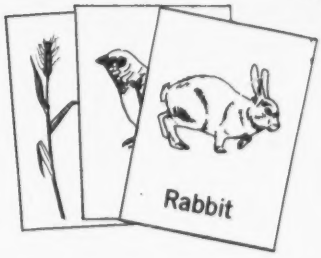
Core B



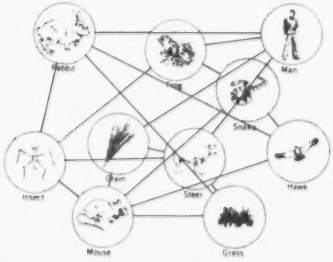
NERGY IN FOOD



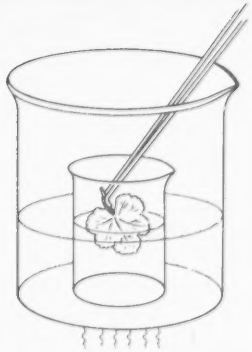
Core C



ENERGY FLOW THROUGH FOOD CHAINS AND WEBS



Core D



FOOD MAKING IN PLANTS

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMEN

CORE A. INTRODUCTION TO ENERGY

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

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2. Appreciate and understand man's

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1. Define energy as "anything that
2. Recognize that the ability to mov
3. Recognize that the amount of and to the amount of energy input.
4. Conclude that energy can be store
5. Recognize different forms of ener

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

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UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE A

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

CORE A RATIONALE

A number of scientific concepts are highly abstract. The notion of energy is one of these. Energy is described as weightless, as not occupying space, and as existing in a variety of forms. Yet nobody really knows what energy is. While the problem of defining exactly what energy is may be rather difficult, the importance of energy to the world ecosystem cannot be overemphasized. The functioning and very existence of all life on Earth is dependent upon a constant supply of energy from the sun. All movements, changes, transformations, and events require energy. Thus understanding and appreciating some basic ideas about energy is prerequisite to understanding one's environment.

The activities comprising this core are intended to familiarize the student with some basic ideas about energy. It is considered essential that each student have as much physical contact with the materials as possible. The student needs to develop a feeling of active involvement rather than watching others perform.

Through a discussion of a simple cork-popping demonstration, a working definition of energy is established: energy is anything that causes something to move or change. This is a nontechnical definition, but certainly adequate for the purposes of this program. The activity attempts to help the students see a need for learning about energy and relate this "new" concept to their everyday life. Throughout the activity attention is also given to observing and predicting events involving energy. The students, in a few years, will be voting citizens. It is essential that they have the experience of making predictions based on present events, for as citizens, they will be asked to vote on numerous issues that affect their future. This is particularly vital in view of the increasing numbers of environmental issues on the ballots of many states.

BAC

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Because energy is
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BACKGROUND INFORMATION FOR THE TEACHER

Because energy is a rather abstract concept, it is often easier to observe than define. For the purposes of this program, however, energy can be defined as "anything that causes something to move or change."

Because energy is a "nonmaterial thing," it is not recyclable; "material things" such as paper and cans are. The ultimate source of all energy on the Earth is the sun. Energy from this source is transformed as it flows from one organism to another. It is important to realize that while material things themselves are recyclable, when energy is released from them, the energy is difficult (often impossible) to recapture and save.

In heating the test tube in Activity 3-2 (Getting Corked Off), the wax is the fuel from which energy is being released in a burning candle. The wick merely serves as a medium for exposing the burning wax to the oxygen in the air. The energy used to pop the cork is coming mostly from the burning wax. The energy in the wax was stored as chemical energy and released as heat energy. It is transferred through the glass to the water. Some of the water is changed to its gaseous form, steam, which occupies a space in excess of 1700 times that of water. The resultant increase in pressure finally "pops the cork." The black residue which accumulates on the test tube is a waste product (carbon) from the burning wax.

As a different example, in Activity 3-2 vinegar and baking soda react, producing large amounts of carbon dioxide. The vigorous production of this gas builds up pressure within the test tube and finally forces the cork to pop.

The movement of the radiometer in Activity 3-2 results from the transformation of light energy to heat energy. One side of each flag in the bulb is black and the other is white. The white side reflects

CORE A RATIONALE (continued)

The interest of the students is stimulated by giving them the opportunity to experiment with scientific apparatus and materials in learning about energy. The activity is somewhat unstructured to begin with in the hope that the students' observations will raise questions that may be answered through further observation and thought.

Continued opportunity to observe and predict is provided. Initially the students make predictions based on their observations. These predictions, recorded on a worksheet, provide the teacher with an assessment of student understanding of the relationship between the amount of heat energy present and the amount of movement in a chemical subjected to that heat.

The students then become actively involved in constructing their own "energy wheels," pinwheels that they cause to turn by using the energy from a burning candle. The strategy encourages them to "discover" ways that they can make the pinwheel turn faster. This provides yet another example of the concept that the greater the input of energy, the greater the resulting change or movement.

When beginning to study energy, students are not always aware that energy can be released by chemicals. They first observe, and then design and perform experiments whereby chemicals cause movement and change. In thinking about what will happen when presented with a specific set of conditions, the students again practice making predictions.

There are numerous instances where information can more clearly and efficiently be presented in graph form. It should be apparant

BACKGROU

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BACKGROUND INFORMATION FOR THE TEACHER (continued)

most of the light (heat) rays. The black side absorbs most of the light (heat) rays. As a consequence of this unequal absorption of the light (heat) the black side of the flags becomes hotter than the white side. The hotter side, therefore, radiates off more heat energy. This unequal radiation of heat acts like a miniature rocket engine and turns the flags. The inside of the bulb of the radiometer is a partial vacuum; therefore, the flags are turned by the excited molecules with almost no friction.

The diffusion of molecules from the crystal of potassium permanganate in the petri dish in Activity 3-3 (Experimenting With Heat Energy) is again the result of heat energy. The molecules break away from the crystal and eventually become evenly distributed through the water. This spreading out of the molecules is greatly speeded up in the hot water because the energy causes the individual molecules to move more rapidly. The same principal applies when the tea bags are placed in water in the "Review Of Success" following Activity 3-3.

The pinwheel used in Activity 3-5 (The Energy Wheel) works because the candle heats the air molecules immediately above the flame causing them to move upward rapidly. The draft created pushes against the wheel blades, causing them to turn. It is a natural consequence that the more candles used, or the closer the candles are held to the wheel, the faster it will turn because of the greater upward draft that is caused by the greater amount of heat.

The dramatic action of the Alka-Seltzer in Activity 3-6 (Chemical Energy) is sure to capture the interest of your students. Alka-Seltzer is essentially a combination of citric acid and a carbonate in dry tablet form. When placed in water the two combine. This results in

CORE A RATIONALE (continued)

to anyone watching TV or reading newspapers and magazines that graphs increasingly are becoming a means of communication. The student is introduced to simple graph interpretation and construction. This newly learned skill is then put to immediate use in translating into graph form the data gathered in Activity 3-6.

Energy is a quantitative factor in the student's environment. The student learns that the amount of energy released from a system is proportional to the amount that entered. The concept is developed by observing and measuring the distance a bottle cap is propelled when a rubber band is stretched to varying lengths. By constructing a simple line graph of the measured distances, the student gains reinforcement of the idea that information can be communicated in a manner other than by the written or spoken word.

BACKGROU

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BACKGROUND INFORMATION FOR THE TEACHER (continued)

the release of carbon dioxide. Vinegar, which is essentially acetic acid and more highly concentrated than citric acid, results in a much stronger reaction. The vigorous release of bubbles builds pressure within the stoppered tube. Here the increased pressure pushes down on the surface of the water, forcing it up and out of the tube and into the beaker.

Me and my Environment

UNIT III
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-1. Growing Plants Page _____ Date planned _____	Bean seeds Containers to plant seeds in Commercial potting soil Popsicle sticks, tongue depressors (or masking tape) Marking pencil		*Fifty - sixty.* *planting.) P* *dried beans f* *Two per student* *styrofoam cup* *Enough to fill* *at local gard* *One per student* Class supply
3-2. Getting Corked Off Page _____ Date planned _____	An electrical appliance Jump rope Chair Candle Matches Paper towels Baking soda Vinegar Lamp or light source Large pieces of butcher paper Magazines or catalogs Paste or glue Scissors	Test tube Cork Test tube holder	*Suggest: fan,* One One other than One One book Class supply One box One bottle One One per student One per student Class supply One pair per stu Two (18 X 150 m Two (to fit 18 X One

PLANNING GUIDE

me activities (*indicated in italics* and an ☛ *in the margin*) must prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

BSCS

st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
eds		*Fifty - sixty. (Soak in water overnight before the day of planting.) Purchase at garden shop, local nursery, or use dried beans from grocery store.* ☛
		Two per student. Collect ahead of time. Suggested containers: styrofoam cups, milk cartons, etc.
		Enough to fill the containers selected for planting. Purchase at local garden center. ☛
g		*One per student. To be used to label the plantings.*
		Class supply
		Suggest: fan, knife, drill, wall clock with second hand, etc.
		One
		One other than a student desk
		One
		One book
		Class supply
		One box
		One bottle
		One
		One per student
		One per student
		Class supply
		One pair per student. Include at least some left-handed scissors.
	Test tube	Two (18 X 150 mm)
	Cork	Two (to fit 18 X 150 mm test tube)
	Test tube holder	One

Me and my Environment

UNIT III
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the* be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies neede

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics an*
3-2. Getting Corked Off (Continued)		Measuring spoons	1/4 and 1/2 tea
		Funnel	One
		Radiometer	One
		Chart	Forms Of Energy
		Camera (Polaroid Square Shooter)	
3-3. Experimenting With Heat Energy	Ice		*Enough to make*
	Hot pad		One
	Spoons		Two per pair of
	Overhead projector		
Page _____	35mm Slide projector		
Date planned _____	Timer or wall clock with second hand		
		400 ml Beakers	Three
		Hot plate	One
		Petri dishes	Two per pair of
		Potassium permanganate crystals	
		Worksheet 3-1	Concentric circ
		Worksheet 3-2	Chart for diffu
		Transparency 3-1	Concentric circ
		Slide 3-1	Worksheet 3-1
		Slide 3-2	Worksheet 3-2
		250 ml Beakers	Two
		Forceps	One

PLANNING GUIDE

ome activities (*indicated in italics and an ☛ in the margin*) must e prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

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ist of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
ish	Materials in Supply Kit	
	Measuring spoons	1/4 and 1/2 teaspoon
	Funnel	One
	Radiometer	One
	Chart	Forms Of Energy
	Camera (Polaroid Square Shooter)	
		Enough to make a glass of ice water
		One
		Two per pair of students
vith		
	400 ml Beakers	Three
	Hot plate	One
	Petri dishes	Two per pair of students
	Potassium permanganate crystals	
	Worksheet 3-1	Concentric circles
	Worksheet 3-2	Chart for diffusion lab
	Transparency 3-1	Concentric circles and chart
	Slide 3-1	Worksheet 3-1
	Slide 3-2	Worksheet 3-2
	250 ml Beakers	Two
	Forceps	One

Me and my Environment

UNIT III
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the* be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies neede

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics an*
3-4. Hot Or Cold -- Review Of Success Page _____ Date planned _____	Tea bags Paper 35mm Slide projector Overhead projector Hot and cold water		*Two*
		Worksheet 3-3	Hot - Cold Tea
		1000 ml Beakers	Two
		Slide 3-3	Back of Workshe
		Transparency 3-2	Front of Worksh
		Petri dishes	Two
		Potassium permanganate crystals	
		Forceps	One
3-5. The Energy Wheel Page _____ Date planned _____	35mm Slide projector		
	Heavy duty aluminum foil		*One roll*
	Large size birthday candles		*Two per student*
	Pencil with eraser		*One per student*
	Straight pin		*One per student*
	Scissors		One pair per st
	Matches		Several books
	Cardboard or heavy paper		One piece 4" X
	Quarters		Several
		Glass bead	One per student
		Rubber stopper with holes	One per student
		Slide 3-4	Clue To Success
		Slide 3-5	Clue To Success
		Slide 3-6	Clue To Success
		Slide 3-7	Clue To Success
		Worksheet 3-4	Clue To Success

PLANNING GUIDE

me activities (*indicated in italics and an* ☛ *in the margin*) must prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

BSCS

st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
		Two
	Worksheet 3-3	Hot - Cold Tea
	1000 ml Beakers	Two
	Slide 3-3	Back of Worksheet 3-3
	Transparency 3-2	Front of Worksheet 3-3
	Petri dishes	Two
	Potassium permanganate crystals	
	Forceps	One
il		*One roll*
ndles		*Two per student*
		One per student
		One per student
		One pair per student
		Several books
er		One piece 4" X 6" per student
		Several
	Glass bead	One per student
	Rubber stopper with holes	One per student (Size 8)
	Slide 3-4	Clue To Success Question 1
	Slide 3-5	Clue To Success Question 2
	Slide 3-6	Clue To Success Question 3
	Slide 3-7	Clue To Success Question 4
	Worksheet 3-4	Clue To Success

4 D

Me and my Environment

UNIT III
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the* be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-6. Chemical Energy Page _____ Date planned _____	35mm Slide projector Pin wheels Detergent Alka-Seltzer tablets Vinegar Cooking oil Tap water	Test tube Rubber stopper Plastic tubing 400 ml Beaker Worksheet 3-5 Slide 3-8 Slide 3-9 Worksheet 3-6	*Constructed in* *For washing to* *Forty-three ta* *One bottle (qu* *One bottle (qu* One per pair o One per pair o 18" piece per One per pair o Alka-Seltzer (Worksheet 3-5 Worksheet 3-6 Alka-Seltzer (
3-7. How Tall Is J. Oscar Hooperstraat Page _____ Date planned _____	35mm Slide projector	Worksheet 3-7 Slide 3-10 Slide 3-11 Slide 3-12 Slide 3-13 Slide 3-14 Slide 3-15 Slide 3-16	Clue To Succes Growth of J. O School Absence Rats of New Yo Clue To Succes Clue To Succes Clue To Succes Clue To Succes

PLANNING GUIDE

me activities (*indicated in italics and an* ➘ *in the margin*) must prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

BSCS

st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
ish	Materials in Supply Kit	
		Constructed in previous activity
		For washing test tubes
		➘ *Forty-three tablets needed for a class of sixteen*
		One bottle (quart)
		One bottle (quart)
	Test tube	One per pair of students (25 X 300 mm)
	Rubber stopper	One per pair of students (Number 4-one hole)
	Plastic tubing	18" piece per pair of students
	400 ml Beaker	One per pair of students
	Worksheet 3-5	Alka-Seltzer (Liquid Variable)
	Slide 3-8	Worksheet 3-5
	Slide 3-9	Worksheet 3-6
	Worksheet 3-6	Alka-Seltzer (Temperature Variable)
	Worksheet 3-7	Clue To Success
	Slide 3-10	Growth of J. Oscar Hooperstraat
	Slide 3-11	School Absences
	Slide 3-12	Rats of New York City
	Slide 3-13	Clue To Success Question 1
	Slide 3-14	Clue To Success Question 2
	Slide 3-15	Clue To Success Question 3
	Slide 3-16	Clue To Success Question 4

Me and my · Environment

UNIT III
CORE A

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ↙ *in the*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics an*
3-8. The High Flyer Page _____ Date planned _____	35mm Slide projector 12" Ruler Nails (1" to 1 1/2" long) Rubber bands Plywood Flyer caps Hammer	Worksheet 3-8 Slide 3-17 Worksheet 3-9 Slide 3-18	*One per team of* *Two per team of* One per team of *One piece (12" x* *One jar cover no about 2" in di* One Chart For High F Worksheet 3-8 Graph For High F Worksheet 3-9

PLANNING GUIDE

ne activities (*indicated in italics and an* ☛ *in the margin*) must prepared several days or weeks in advance. Use this summary as eaching and preparation schedule. All supplies needed are listed.

BSCS

t of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
h	Materials in Supply Kit	
g)		*One per team of three students* *Two per team of three students* One per team of three students (3 1/2" to 4" unstretched length) *One piece (12" X 12") per team of three students* *One jar cover needed per team of three students. Cover should be about 2" in diameter. Suggest tops off of paste jars, etc.* ☛
	Worksheet 3-8 Slide 3-17 Worksheet 3-9 Slide 3-18	One Chart For High Flyer Worksheet 3-8 Graph For High Flyer Worksheet 3-9

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

MATERIALS

*Bean seeds (soaked overnight)
*Containers (styrofoam cups, cut off milk cartons, etc.) two per student
*Commercial potting soil
*Popsicle sticks (enough for one per student) or masking tape
*Marking pencil

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-1. Growing Plants

Later in this unit a number of plants will be required for experimentation. Commercial plants could be used but in keeping with the philosophy of fostering student participation, the students will grow the plants themselves. This activity has no direct relationship to the unit objectives, but is merely a preparatory activity. It is hoped that through this plant-growing experience, the student's ideas about plant needs will be reinforced and he will conclude that air, water, and sunlight are necessary for growth.

Teacher Preparation:

1. Bean seeds are suggested because of their rapid germination and growth. Other seeds may be planted and perhaps will grow in time, but if other seeds are used, they should be used along with the bean seeds.

2. Soak bean seeds overnight to speed germination.

3. Set up as many containers as there are students in class and plant two beans yourself in each of these containers. These will serve as extra plants, which you should care for to insure that there will be enough plants for the activities in

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

ACTIVITY 3-1. GROWING PLANTS

BSCS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

TEACHING STRATEGIES

-1. Growing Plants

his unit a number of plants will be required mentation. Commercial plants could be used ping with the philosophy of fostering student ion, the students will grow the plants them- his activity has no direct relationship to bjectives, but is merely a preparatory It is hoped that through this plant-growing , the student's ideas about plant needs will ced and he will conclude that air, water, ht are necessary for growth.

eparation:

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bean seeds overnight to speed germination.

up as many containers as there are students in s and plant two beans yourself in each of e containers. These will serve as extra ts, which you should care for to insure that e will be enough plants for the activities in

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have planted some bean seeds.
--have participated in a discussion about the care of plants.

ACTIVITY 3-1

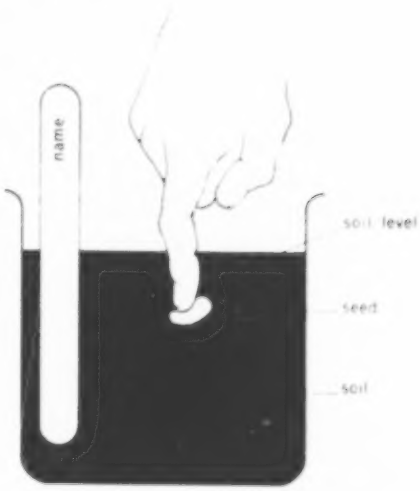
6

MATERIALS	TEACHING STRATEGIES
	Core D. Also, if the students' plants do not all grow, or if they want to keep them, there will still be enough for the activities. 4. Coleus or variegated geranium plants will be needed later in the unit. Since these are sometimes difficult to locate, start looking now for a place where they can be purchased so you will be sure to have them available when needed. Explain to the students what they [illegible] to do by saying: LATER IN THIS UNIT WE WILL NEED SOME PLANTS FOR OUR EXPERIMENTS. THEREFORE, WE ARE GOING TO PLANT SOME SEEDS. BEFORE WE PLANT OUR SEEDS, WHAT THINGS MUST WE REMEMBER TO DO WHEN GROWING AND TAKING CARE OF PLANTS? As students suggest the needs of the plant, write them on the chalkboard. Say: ALL YOUR SUGGESTIONS ARE GOOD ONES, BUT THE ONES WE MUST BE ESPECIALLY CAREFUL TO REMEMBER ARE SUNLIGHT AND WATER. (Circle or underline these on the chalkboard.) WHAT WILL HAPPEN IF OUR PLANTS DO NOT GET SUNLIGHT AND WATER? Instruct the students to plant their seeds by filling their containers almost to the top with potting soil. Distribute two bean seeds each to the students and tell them to push each seed under the soil, pressing it down about as far as the length of a fingernail, and then covering it. Tell them to write their names with pencils on popsicle sticks and insert the sticks into the soil

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
. Also, if the students' plants do not all or if they want to keep them, there will still ugh for the activities. or variegated geranium plants will be needed in the unit. Since these are sometimes diffi- o locate, start looking now for a place where an be purchased so you will be sure to have vailable when needed.	Students:
he students what they are to do by saying: N THIS UNIT WE WILL NEED SOME PLANTS EXPERIMENTS. THEREFORE, WE ARE GOING TO OME SEEDS. BEFORE WE PLANT OUR SEEDS, INGS MUST WE REMEMBER TO DO WHEN AND TAKING CARE OF PLANTS?	--suggest, "Water the plants," "Put the plants in the sun," "They need air," "Put them near an open window," "Give them attention," "Fertilize them."
suggest the needs of the plant, write them on rd.	
R SUGGESTIONS ARE GOOD ONES, BUT THE ONES BE ESPECIALLY CAREFUL TO REMEMBER ARE T AND WATER. (Circle or underline these chalkboard.) WHAT WILL HAPPEN IF OUR DO NOT GET SUNLIGHT AND WATER?	--guess, "They'll die," "Wilt," "Shrivel up."
students to plant their seeds by filling ners almost to the top with potting soil. vo bean seeds each to the students and tell each seed under the soil, pressing it down as the length of a fingernail, and then Tell them to write their names with pencils ticks and insert the sticks into the soil	

MATERIALS

Diagram 3-1



TEACHING STRATEGIES

at the edge of the containers, as shown in Diagram 3-1. If popsicle sticks cannot be obtained, have the students write their names on pieces of masking tape and stick the pieces of tape to their containers. If the beans have not sprouted within a week, allow students to plant two more seeds. Caution each of the students that since he is in charge of the plant, and since it belongs to him, he must be responsible for watering it properly.

The soil should be kept moist but not soaked. You might show them the difference with two of the extra containers.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ge of the containers, as shown in Diagram 3-1. le sticks cannot be obtained, have the students ir names on pieces of masking tape and stick the tape to their containers. If the beans have ced within a week, allow students to plant two s. Caution each of the students that since he rge of the plant, and since it belongs to him, e responsible for watering it properly. hould be kept moist but not soaked. You might the difference with two of the extra containers.	

UNIT III, CORE A
ACTIVITY 3-1: "Growing Plants"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) _____:

17. Was finding a place to keep and care for the duplicate set of bean plants a problem?
☐ No ☐ Yes: Comment.

18. Have any students had difficulty caring for their plants?
☐ No ☐ Yes
How many? ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation. EMH Feedback Form Ic

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A
ACTIVITY 3-1: "Growing Plants"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

5. Recognize different for of energy (heat, light, chemical, and electrical).

MATERIALS

TEACHING STRATEGIES

Activity 3-2. Getting Corked Off

Through discussion and observation the student will expand his concept of energy, building background information for later activities. Demonstrations and participation experiences will provide opportunities to identify forms of energy and their sources.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-2. GETTING CORKED OFF

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

TEACHING STRATEGIES

-2. Getting Corked Off

scussion and observation the student will concept of energy, building background infor- later activities. Demonstrations and parti- xperiences will provide opportunities to orms of energy and their sources.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--be able to define energy as "anything that causes something to move or change."
--have observed and participated in demonstrations showing four different kinds of energy in action.
--list and identify the four kinds of energy as heat, light, electrical energy, and chemical energy.
--have taken a picture showing one kind of energy in his school environment.
--have discussed his picture of energy with other students in the class.

ACTIVITY 3-2

10

MATERIALS

1 Test tube, Pyrex, (18 X 150 mm)
1 Cork to fit test tube
1 Test tube holder
*An electrical appliance (mixer, fan, knife, drill, wall clock if second hand moves)
*Jump rope
*Chair
*Candle
*Matches
*Test tube rack

(Continued later in activity)

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. *Try both cork-popping demonstrations several times prior to the class* to gain confidence, to determine roughly how long it takes, and to determine how tightly it is necessary to stopper the tube. In the demonstration where water is boiled, *a cork too tightly fitted may allow pressure to build up high enough to shatter the tube.*

2. In the baking soda-vinegar demonstration, it is very important that the cork be placed in the test tube immediately after adding the vinegar. Precautions should be taken to cover the work area because some liquid may spurt out on the table.

For the beginning demonstration you will fill a test tube with water, cork it, and hold it over the flame of a candle with the test tube holder. To focus the students' attention on the test tube describe what you are doing.

Hold up the test tube and ask:

WHAT IS THIS?

NOW WATCH CAREFULLY WHAT I'M DOING. I'M GOING TO ASK YOU TO DESCRIBE WHAT I'VE DONE.

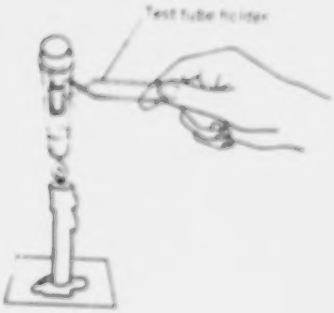
Fill the test tube 1/5 full of water and set the cork in the tube, tapping it with your finger. While doing this ask:

WHAT HAVE I DONE THUS FAR?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ration:	
h cork-popping demonstrations several times o the class to gain confidence, to determine how long it takes, and to determine how it is necessary to stopper the tube. In nonstration where water is boiled, *a cork ghtly fitted may allow pressure to build up ough to shatter the tube.*	
baking soda-vinegar demonstration, it is portant that the cork be placed in the test mediately after adding the vinegar. Precau- should be taken to cover the work area some liquid may spurt out on the table.	
ning demonstration you will fill a test tube cork it, and hold it over the flame of a the test tube holder. To focus the students' the test tube describe what you are doing.	
test tube and ask:	
THIS?	--respond, "A test tube," "A tube," "A glass tube."
CH CAREFULLY WHAT I'M DOING. I'M GOING OU TO DESCRIBE WHAT I'VE DONE.	
tube 1/5 full of water and set the cork in pping it with your finger. While doing this	
VE I DONE THUS FAR?	--after careful observation, state what you did -- put water in the test tube so that it was about 1/5 full and placed a cork in the end.

MATERIALS

Diagram 3-2



TEACHING STRATEGIES

Ask a student to light the candle, let several drops of hot wax drip on a piece of paper, and set the candle in it, as shown in Diagram 3-2.

CAUTIONS:

1. Do the remainder of this experiment as a demonstration only. It could be somewhat dangerous in the hands of the students.

2. Do not stopper the test tube too tightly.

3. Use only a cork stopper, NOT RUBBER, which fits too snugly.

4. Make sure the test tube is Pyrex.

5. Point the test tube away from both you and the students during the heating process.

6. Do not attempt to remove the stopper with your fingers while the water is still hot, or the water will spurt out.

Say:

AGAIN WATCH AND DESCRIBE WHAT I'M DOING.

Be sure the tube is at an angle pointing away from you and the students. Move the tube in and out of the flame of the lighted candle in order not to get too violent a reaction.

Continue doing this until the cork pops out.

NOTE: The cork pops because of the expanding gases in the test tube. Heat causes the gas molecules to move more rapidly.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
dent to light the candle, let several drops of rip on a piece of paper, and set the candle in own in Diagram 3-2.	Students: --light the candle.
the remainder of this experiment as a demonstra- n only. It could be somewhat dangerous in the ds of the students. not stopper the test tube too tightly. only a cork stopper, NOT RUBBER, which fits snugly. sure the test tube is Pyrex. t the test tube away from both you and the ents during the heating process. ot attempt to remove the stopper with your ers while the water is still hot, or the r will spurt out.	
WATCH AND DESCRIBE WHAT I'M DOING. e tube is at an angle pointing away from you and ts. Move the tube in and out of the flame of d candle in order not to get too violent a oing this until the cork pops out. cork pops because of the expanding gases in test tube. Heat causes the gas molecules to e more rapidly.	--observe and describe the demonstration.

ACTIVITY 3-2

(12)

MATERIALS	TEACHING STRATEGIES
	OBSERVATION T
	While students are observing, encourage them to describe as many things as possible that they see happening.
	After the demonstration is completed, ask: WHAT HAPPENED?
	NOTE: If students observe that the test tube turned black, you might help them decide that the black color is on the test tube and that it is coming from the candle and coating the outside of the test tube. It is not the water that is turning black. Pass the test tube around so they can make this determination. WOULD THE SAME THING HAPPEN IF WE DIDN'T HEAT THE TEST TUBE? Regardless of what the answer is ask the students: HOW COULD WE FIND OUT? WHAT CAUSED THE CORK TO POP? (Student's name), DO YOU AGREE WITH THAT? WHAT DO YOU THINK? (Student's name), DO YOU AGREE WITH THAT? WHAT DO YOU THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
OBSERVATION TIME	
ts are observing, encourage them to describe gs as possible that they see happening.	--notice that you are moving the test tube back and forth over the flame, that the water is boiling, steam is forming, tube is getting black, etc.
monstration is completed, ask:	
PPENED?	--respond, "The cork popped out," "The test tube got black," "The water boiled," "The pressure made it pop," "Steam came out."
udents observe that the test tube turned , you might help them decide that the black is on the test tube and that it is coming the candle and coating the outside of the tube. It is not the water that is turning . Pass the test tube around so they can this determination.	
IE SAME THING HAPPEN IF WE DIDN'T HEAT T TUBE?	--speculate that it wouldn't.
f what the answer is ask the students:	
LD WE FIND OUT?	--suggest repeating the experiment by passing the test tube over the unlighted candle.
USED THE CORK TO POP?	--respond, "Flame," "Heat," "Candle," "Pressure," "Pressure from the steam," "Hot water."
t's name), DO YOU AGREE WITH THAT? YOU THINK?	--express agreement or disagreement, giving reasons.
t's name), DO YOU AGREE WITH THAT? YOU THINK	--express agreement or disagreement, giving reasons.

MATERIAS	TEACHING STRATEGIES
	NOTE: Encourage many students to participate in the speculation, judging, and observing by asking one student if he agrees with another, by asking one student if he has a different idea or comment. If the students do mention the word energy say: ALL OF YOUR IDEAS ARE GOOD, BUT ONE OF YOU SUGGESTED THE WORD THAT SCIENTISTS USE MOST OFTEN -- "ENERGY." ENERGY MADE THE CORK POP. Write the word "energy" on the chalkboard. If students do not mention the word energy, say: THESE ARE ALL GOOD IDEAS. WE HAVE ANOTHER WORD THAT CAN BE USED INSTEAD OF HEAT (PRESSURE, STEAM, CANDLE OR ANY OTHER WORD SUGGESTED). THAT WORD IS "ENERGY." Continue by saying: ANYTHING THAT CAN CAUSE SOMETHING TO MOVE OR TO CHANGE WE CALL ENERGY. HAVE YOU EVER HAD THE FEELING THAT YOU JUST DON'T HAVE ANY ENERGY? WHAT'S IT LIKE TO HAVE THAT FEELING? Ask for volunteers or select two students to come to the front of the room. Ask one student to jump rope and ask the other to stand perfectly still. Then ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ourage many students to participate in the culation, judging, and observing by asking student if he agrees with another, by ing one student if he has a different idea comment.	
dents do mention the word energy say:	
F YOUR IDEAS ARE GOOD, BUT ONE OF YOU STED THE WORD THAT SCIENTISTS USE MOST -- "ENERGY." ENERGY MADE THE CORK POP.	
word "energy" on the chalkboard.	
If students do not mention the word energy, say:	
THESE ARE ALL GOOD IDEAS. WE HAVE ANOTHER WORD THAT CAN BE USED INSTEAD OF HEAT (PRESSURE, STEAM, CANDLE OR ANY OTHER WORD SUGGESTED). THAT WORD IS "ENERGY."	
y saying:	
ING THAT CAN CAUSE SOMETHING TO MOVE OR ANGE WE CALL ENERGY.	
YOU EVER HAD THE FEELING THAT YOU JUST HAVE ANY ENERGY?	--respond, "Yes."
S IT LIKE TO HAVE THAT FEELING?	--respond, "I don't feel like doing anything," "I don't want to get up," "Lazy," "Tired."
lunteers or select two students to come to the he room. Ask one student to jump rope and ask to stand perfectly still.	

ACTIVITY 3-2

14

MATERIALS

TEACHING STRATEGIES

WHO LOOKS LIKE HE IS USING THE MOST ENERGY, (student's name) OR (student's name)?

WHY?

IS EITHER PERSON USING ANY ENERGY?

WHAT IS HE DOING?

DOES THAT TAKE ENERGY?

Direct the two students to return to their seats. Have another student pick up and carry a chair from one end of the room to the other.

Ask:

WHAT DID (student's name) DO?

WHAT DID HE USE TO DO THIS?

If the students say that arms or muscles are doing the work, ask:

WHAT ARE (student's name) ARMS (MUSCLES) USING TO CARRY THE CHAIR?

THINK OF YOUR MOTHER SCRUBBING THE FLOOR OR YOUR FATHER MOWING THE LAWN. WHAT ARE THEY BOTH USING TO DO THIS WORK?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
KS LIKE HE IS USING THE MOST ENERGY, t's name) OR (student's name)?	--identify student jumping rope.
	--respond, "Because he's doing something," "He's jumping up and down," "He's jumping rope."
ER PERSON USING ANY ENERGY?	--respond, "Yes," "No," "I don't know."
HE DOING?	--reply, "Moving," "Jumping."
AT TAKE ENERGY?	--infer that because energy was defined as anything that can cause something to move or to change, the student is using energy.
wo students to return to their seats. Have ent pick up and carry a chair from one end to the other.	
D (student's name) DO?	--respond, "Carry the chair."
D HE USE TO DO THIS?	--respond, "Arms," "Energy."
nts say that arms or muscles are doing the	
E (student's name) ARMS (MUSCLES) USING Y THE CHAIR?	--infer that energy is used.
Y YOUR MOTHER SCRUBBING THE FLOOR OR THER MOWING THE LAWN. WHAT ARE THEY ING TO DO THIS WORK?	--respond, "Energy."

MATERIALS	TEACHING STRATEGIES
	WE'VE SEEN THE CORK FLY OUT OF THE TEST TUBE. WE'VE SEEN (student's name) JUMP ROPE. WE'VE SEEN (student's name) CARRY THE CHAIR. TO DO THESE THINGS WE NEED ENERGY. WHAT IS ENERGY? On the board, after the word "energy," write "is anything that causes something to move or change." IS THE ENERGY OR "GO POWER" NEEDED TO DO DIFFERENT THINGS ALL THE SAME? WHAT ARE SOME THINGS OTHER THAN PEOPLE THAT USE ENERGY? WHAT KINDS OF ENERGY DO THEY USE? ARE ALL THESE ENERGIES ALIKE? Ask a student to come to the front of the room and operate any electrical appliance that demonstrates movement. (Fan, carving knife, electrical toothbrush, 1/4" drill, mixer, wall clock with moving second hand.) WHAT IS HAPPENING? WHAT IS MAKING THE (appliance) MOVE? WHAT KIND OF ENERGY IS MAKING THE (appliance) WORK? Using the same candle and test tube setup as at the beginning of the activity (without a cork), have another student bring water to a boil in the test tube.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
SEEN THE CORK FLY OUT OF THE TEST TUBE. SEEN (student's name) JUMP ROPE. WE'VE (student's name) CARRY THE CHAIR. TO DO THINGS WE NEED ENERGY. WHAT IS ENERGY?	--respond, "It's something that causes something else to move."
rd, after the word "energy," write "is anything s something to move or change."	
E ENERGY OR "GO POWER" NEEDED TO DO RENT THINGS ALL THE SAME?	--guess, "I don't know," "Yes," "No."
ARE SOME THINGS OTHER THAN PEOPLE THAT NERGY?	--suggest such things as cars and other machines such as TV sets, furnaces, stoves, motorcycles, bombs, dynamite, etc.
KINDS OF ENERGY DO THEY USE?	--respond, "Electricity," "Motors," "Fire," "Heat," "Muscles," "Light," "Food."
LL THESE ENERGIES ALIKE?	--guess that they may not be alike.
nt to come to the front of the room and operate ical appliance that demonstrates movement. ing knife, electrical toothbrush, 1/4" drill, clock with moving second hand.)	
IS HAPPENING?	--respond, "The fan's turning," "The drill is turning," "It's moving," etc.
IS MAKING THE (appliance) MOVE?	--respond, "Energy."
KIND OF ENERGY IS MAKING THE (appliance)	--respond, "Electrical," "Electricity."
ame candle and test tube setup as at the begin- activity (without a cork), have another stu- water to a boil in the test tube.	

ACTIVITY 3-2

16

MATERIALS

*Paper towels to cover work surface
*Baking soda
*Vinegar
Measuring spoons (1/4 and 1/2 teaspoon)
Funnel
Test tube, Pyrex (18 X 150 mm)
Cork to fit test tube
Test tube holder
*Test tube rack

*Not furnished in materials kit

TEACHING STRATEGIES

WHAT IS BEING DONE HERE?

IS SOMETHING MOVING OR CHANGING?

IS ENERGY BEING USED THEN?

WHAT KIND OF ENERGY IS MAKING THE WATER BOIL?

Now let's look at another demonstration. Display the materials to be used:

HOW IS THIS ONE DIFFERENT FROM THE LAST ONE?

WHAT'S THE DIFFERENCE BETWEEN THESE MATERIALS AND THE ONES WE USED IN THE LAST DEMONSTRATION?

WATCH WHAT I DO.

Perform the following demonstration.

1. Place a medium sized test tube in the test tube rack.
2. Using a funnel, add 1/4 teaspoon baking soda.
3. Add 1/2 teaspoon vinegar and very quickly stopper the tube with the cork. (Since the reaction happens so quickly, it is suggested that the cork be held with one hand next to the opening of the tube while the vinegar is added with the other.) In order to prevent confusion in the students' minds between chemicals and food, it might be best to have the baking soda and vinegar in containers other than the commercial ones.

Ask:

Stu

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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
BEING DONE HERE?	Students:
HING MOVING OR CHANGING?	--respond, "The water's boiling," "It's bubbling," "Water's getting hot."
Y BEING USED THEN?	--respond, "Yes," "The stuff inside," "The water."
D OF ENERGY IS MAKING THE WATER BOIL?	--infer that since something is moving and changing, energy is being used.
k at another demonstration. Display the be used:	--respond, "Heat," "Fire."
HIS ONE DIFFERENT FROM THE LAST ONE?	--reply, "The stuff is different," "We're not using a machine," "We're using different things."
HE DIFFERENCE BETWEEN THESE MATERIALS ONES WE USED IN THE LAST DEMONSTRATION?	--suggest that they aren't plugged in, they don't have movable parts, they're not electrical.
AT I DO.	
ollowing demonstration.	
medium sized test tube in the test tube rack.	
funnel, add 1/4 teaspoon baking soda.	
teaspoon vinegar and very quickly stopper e with the cork. (Since the reaction so quickly, it is suggested that the cork with one hand next to the opening of the ile the vinegar is added with the other.) r to prevent confusion in the students' etween chemicals and food, it might be have the baking soda and vinegar in ers other than the commercial ones.	

MATERIALS	TEACHING STRATEGIES
	WHAT HAPPENED? DID SOMETHING MOVE OR CHANGE? WAS ENERGY USED? WHAT KIND OF ENERGY MADE THE CORK POP? If "chemical energy" is not suggested, say: THE POWDERED CHEMICAL IS BAKING SODA AND THE LIQUID CHEMICAL IS VINEGAR. THE CORK POPPED BECAUSE THESE TWO CHEMICALS REACTED WITH EACH OTHER. CALL THIS KIND OF ENERGY CHEMICAL ENERGY. If student interest is high, this demonstration may be repeated by individual students, for there is no danger involved. Precautions, such as covering the working areas, should be taken to catch the fluid which will spill out of the tubes. Say: LET'S LOOK AT STILL ANOTHER DEMONSTRATION.
Radiometer *Lamp or light source	Set the radiometer included in the kit in direct sunlight. Make sure it is easily visible to all students. If direct sunlight is not available, turn on a lamp close to the radiometer. Ask: WHAT IS HAPPENING TO THIS RADIOMETER?
*Not furnished in materials kit	

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
HAPPENED?	Students:
OMETHING MOVE OR CHANGE?	--respond, "Cork blew off," "Cork popped," "The stuff bubbled."
NERGY USED?	--respond, "Yes."
KIND OF ENERGY MADE THE CORK POP?	--infer that because something moved or changed, energy was being used.
If "chemical energy" is not suggested, say:	--respond, "The stuff you put in the test tube," "Chemical energy."
THE POWDERED CHEMICAL IS BAKING SODA AND THE LIQUID CHEMICAL IS VINEGAR. THE CORK POPPED BECAUSE THESE TWO CHEMICALS REACTED WITH EACH OTHER. CALL THIS KIND OF ENERGY CHEMICAL ENERGY.	
interest is high, this demonstration may be y individual students, for there is no danger Precautions, such as covering the working uld be taken to catch the fluid which will of the tubes.	
LOOK AT STILL ANOTHER DEMONSTRATION.	
diometer included in the kit in direct sunlight. it is easily visible to all students. If direct s not available, turn on a lamp close to the .	
IS HAPPENING TO THIS RADIOMETER?	--respond, "It's turning," "It's moving," "It's spinning."

ACTIVITY 3-2

18

MATERIALS

TEACHING STRATEGIES

IS SOMETHING MOVING OR CHANGING?

IS ENERGY BEING USED?

WHAT KIND OF ENERGY IS MAKING IT SPIN?

HOW COULD WE SHOW THAT IT IS REALLY LIGHT ENERGY THAT IS MAKING IT MOVE?

Stand or put something between the radiometer and the light source to show that without light the radiometer slows down and finally stops.

To conclude this activity, ask:

SO FAR WE HAVE SEEN FOUR DIFFERENT KINDS OF ENERGY DO WORK. WHAT ARE THE FOUR KINDS?

Write the kinds of energy on the board.

WHAT DOES ENERGY DO?

It is recognized that other forms of energy exist, but these four are sufficient for understanding the concept of energy at this point.

CLUES TO SU

This instructional assessment is designed to find out if the student has formed an idea of what energy is and to see if he understands that there are many forms of energy.

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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
THING MOVING OR CHANGING?	Students: --respond, "Yes."
Y BEING USED?	--infer that since something is moving or changing, energy is being used.
D OF ENERGY IS MAKING IT SPIN?	--respond, "Sunlight," "Light energy."
D WE SHOW THAT IT IS REALLY LIGHT ENERGY MAKING IT MOVE?	--suggest putting it in the dark.
something between the radiometer and the light w that without light the radiometer slows down tops.	
his activity, ask:	
E HAVE SEEN FOUR DIFFERENT KINDS OF O WORK. WHAT ARE THE FOUR KINDS?	--recall and state, "Electrical," "Heat," "Chemical," and "Light."
ds of energy on the board.	
S ENERGY DO?	--respond, "Makes something move," "Makes something change," "Does something," "Makes something work."
zed that other forms of energy exist, but e sufficient for understanding the concept this point.	

CLUES TO SUCCESS

ional assessment is designed to find out if as formed an idea of what energy is and to erstands that there are many forms of energy.

MATERIALS	TEACHING STRATEGIES
*Large pieces of butcher paper, 3' X 3' newsprint, or other large types of paper (at least one for every student) *Magazines, catalogs (at least one per student) *Paste or glue (one bottle per student) *Scissors (one pair for every student) Chart 3-1 (of forms of energy) (Continued on next page) *Not furnished in materials kit	*He will be asked to identify forms of energy he uses or sees in his world. He will do this by cutting out pictures from magazines or catalogs, photographing things he sees everyday that involve energy, then labeling the form of energy each of these things involves.* Just prior to the activity on making an energy chart, organize your students in pairs for the purpose of taking pictures. (The pupils are paired only for the picture taking exercises.) The photographing will be done simultaneously with the individual construction of energy charts. Instruct each pair of students to take two pictures in their immediate school environment, inside and/or outside. Each picture should show an example of a different type of energy. (Direct students to take four pictures, one for each form of energy, if film supply permits.) Be sure to secure permission slips for students, if needed. Have students label pictures properly, making sure to list the form of energy that each picture represents. At the conclusion of the chartmaking exercise, display the photos on the bulletin board for a show-and-tell discussion. Ask: IN THE LAST PART OF THIS ACTIVITY WE TRIED TO SEE IF WE COULD THINK OF DIFFERENT THINGS THAT USE ENERGY. WHAT ARE SOME OF THESE THINGS? Encourage each student to recall at least one item. List the items on the chalkboard. Display the wall chart of forms of energy and say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
asked to identify forms of energy he uses or world. He will do this by cutting out pictures nes or catalogs, photographing things he sees at involve energy, then labeling the form of of these things involves.	Students:
to the activity on making an energy chart, ur students in pairs for the purpose of taking (The pupils are paired only for the picture cises.) The photographing will be done simul- vith the individual construction of energy	
ch pair of students to take two pictures in liate school environment, inside and/or outside. e should show an example of a different type (Direct students to take four pictures, one rm of energy, if film supply permits.) Be ure permission slips for students, if needed.	--engage in taking pictures to represent various forms of energy.
ts label pictures properly, making sure to list energy that each picture represents. At the of the chartmaking exercise, display the photos etin board for a show-and-tell discussion.	
LAST PART OF THIS ACTIVITY WE TRIED TO WE COULD THINK OF DIFFERENT THINGS THAT ERGY. WHAT ARE SOME OF THESE THINGS?	--recall the items used to demonstrate energy (candle, match, steam, electrical appliance, vinegar, baking soda, sunlight or lamp, radiometer).
ach student to recall at least one item. List n the chalkboard. Display the wall chart of ergy and say:	

ACTIVITY 3-2

28

MATERIALS	TEACHING STRATEGIES	
Camera (Polaroid SquareShooter) Film Flash cubes	HERE IS A CHART THAT SUMS UP ALMOST EVERYTHING WE TALKED ABOUT IN THIS ACTIVITY. IT MIGHT HELP US TO REMEMBER SOME OF THE THINGS WE DID. Ask one or more of the students to describe the chart. Tell students that today each student is going to make his own chart of energy forms. Have available in the classroom many magazines and/or catalogs and instruct the students to cut out as many examples of things that use energy as they can find. They can either paste these pictures on a large piece of paper to make a large chart or use several pieces of smaller sized paper to paste the pictures on and later assemble them into a scrapbook. Tell students that underneath or near each picture of energy in use they are to label what form of energy it is (heat, chemical, light, electrical). Have these words written in plain view on the wall chart or chalkboard for the students to see. Tell students they should try to find at least three examples of each kind of energy. An understanding of energy forms is indicated by posters that have at least three acceptable examples of each type of energy. Some things use more than one kind of energy to operate (stove uses both heat and electrical) so in certain cases more than one answer may be acceptable.	St -- -- WORK TIME

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
A CHART THAT SUMS UP ALMOST EVERYTHING ED ABOUT IN THIS ACTIVITY. IT MIGHT HELP EMEMBER SOME OF THE THINGS WE DID.	
ore of the students to describe the chart.	--describe the word energy in the center and the four kinds of energy, one in each corner, connected to the word energy by arrows. Also describe the pictures included under each kind of energy.
that today each student is going to make of energy forms. Have available in the ny magazines and/or catalogs and instruct the ut out as many examples of things that use y can find. They can either paste these large piece of paper to make a large chart l pieces of smaller sized paper to paste the nd later assemble them into a scrapbook. that underneath or near each picture of they are to label what form of energy it is al, light, electrical). Have these words ain view on the wall chart or chalkboard nts to see. Tell students they should try ast three examples of each kind of energy.	--construct energy chart or scrapbook.
WORK TIME	
ling of energy forms is indicated by posters least three acceptable examples of each type ome things use more than one kind of energy tove uses both heat and electrical) so in more than one answer may be acceptable.	

MATERIALS	TEACHING STRATEGIES
	Say: NOW THAT YOU HAVE COMPLETED YOUR ENERGY CHARTS, LET US SEE WHAT KIND OF ENERGY IS BEING USED IN OUR SCHOOL ENVIRONMENT. Have students gather around bulletin board. Let each student explain his picture and indicate the type of energy evident. After each picture has been discussed by the taker, allow other class members to re-examine pictures in search of additional forms of energy within the same photo. When all discussion is over, ask: HAVE WE TAKEN PICTURES THAT REPRESENT THE FOUR FORMS OF ENERGY THAT WE STUDIED? If any forms are omitted, select two students to find representatives of the missing forms of energy; then photograph them and add them to the bulletin board display.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
THAT YOU HAVE COMPLETED YOUR ENERGY CHARTS, US SEE WHAT KIND OF ENERGY IS BEING USED IN SCHOOL ENVIRONMENT.	
onts gather around bulletin board. Let each xplain his picture and indicate the type of ident. After each picture has been discussed ker, allow other class members to re-examine in search of additional forms of energy within photo.	--discuss picture, giving the type of energy it represents.
liscussion is over, ask:	
WE TAKEN PICTURES THAT REPRESENT THE FOUR S OF ENERGY THAT WE STUDIED?	--respond, "Yes," "No," "I think so."
rms are omitted, select two students to find atives of the missing forms of energy; then them and add them to the bulletin board dis-	

UNIT III, CORE A
ACTIVITY 3-2: "Getting Corked Off"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. How many students appeared to know about various sources or kinds of energy?
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

18. List every student whose poster did not contain three acceptable examples of each type of energy: _____ _____ _____ _____
_____ _____ _____ _____ _____

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation. EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A
ACTIVITY 3-2: "Getting Corked Off"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

MATERIALS

3 Beakers, Pyrex (400 ml)
*Ice for ice water
Hot plate or stove
*Hot pad for handling beaker
2 Petri dishes per pair of students
*2 Spoons per pair of students

(Continued on next page)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-3. Experimenting With Heat Energy

Through experimentation, the student will associate doing and the rate of doing something with energy. This builds background information for later activities which associate food with energy. More experience in predicting events, comparing conditions, and recording information is provided. Students also will have more experiences working cooperatively with others.

Teacher Preparation:

1. Begin heating water in a Pyrex beaker on the hot plate 20-30 minutes before the science period. Be sure to use a hot plate or stove to heat the water, since heat from an appliance such as a food warmer is not sufficient to bring water to a boil.

2. Have a beaker containing ice cubes and water ready.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-3. EXPERIMENTING WITH HEAT ENERGY

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

TEACHING STRATEGIES

-3. Experimenting With Heat Energy

perimentation, the student will associate the rate of doing something with energy. This kground information for later activities which food with energy. More experience in preents, comparing conditions, and recording n is provided. Students also will have more s working cooperatively with others.

eparation:

n heating water in a Pyrex beaker on the hot e 20-30 minutes before the science period. ure to use a hot plate or stove to heat the r, since heat from an appliance such as a warmer is not sufficient to bring water boil.

a beaker containing ice cubes and water ready.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have predicted at what temperature water can move something fastest.
--have associated more movement, more rapid movement, and more energy with higher temperatures.
--have performed the experiment, collected data, and discussed the results.

ACTIVITY 3-3

MATERIALS

Potassium permanganate crystals
Worksheets 3-1 and 3-2
*Overhead projector
Transparency 3-1 (of Worksheets 3-1 and 3-2)
Slides 3-1 and 3-2
*Timer or wall clock with second hand
2 Beakers (250 ml)
Tweezers
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

3. Use caution in handling the potassium permanganate. It is poisonous. Do not get it on the skin. If the chemical is spilled on the skin, flush immediately with water.

4. A solid, level surface is necessary for the crystal activity. If your room has slanted desks or tables that bump easily, have the students do the activity on the floor.

5. Practice the crystal movement demonstration before class.

Display the beaker of ice water and fill another beaker with water from the tap.

Then ask:

IS THE WATER IN THESE TWO CONTAINERS THE SAME?

HOW ARE THEY DIFFERENT?

Select a student to come up and feel both beakers of water.

Then ask:

WHICH OF THESE IS COLDER?

WHICH OF THESE IS WARMER?

WHICH ONE CONTAINS MORE HEAT ENERGY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ntion in handling the potassium permanganate. poisonous. Do not get it on the skin. If the al is spilled on the skin, flush immediately ater.	
d, level surface is necessary for the crystal ty. If your room has slanted desks or tables ump easily, have the students do the activity floor.	
ce the crystal movement demonstration before	
beaker of ice water and fill another beaker rom the tap.	
VATER IN THESE TWO CONTAINERS THE SAME?	--respond, "No."
THEY DIFFERENT?	--compare and differentiate between the two beakers by saying, "One has ice water in it and the other has water you just got from the faucet."
lent to come up and feel both beakers of water.	
THESE IS COLDER?	--identify the one with cold water.
THESE IS WARMER?	--identify the one with tap water.
E CONTAINS MORE HEAT ENERGY?	--associate a higher temperature with a greater level of energy and respond, "Tap water has more energy than ice water."

MATERIALS	TEACHING STRATEGIES
	WHAT WOULD I HAVE TO DO TO GIVE THE TAP WATER MORE HEAT ENERGY? Continue by placing these two beakers next to the one that is boiling and say: I HAVE SOME WATER BOILING ON THE HOT PLATE. (Point to the boiling water.) LET'S MAKE SOME PREDICTIONS. DOES ANYONE KNOW WHAT A PREDICTION IS? WHICH OF THE THREE BEAKERS OF WATER HAS THE MOST ENERGY? WHICH OF THE THREE TEMPERATURES OF WATER COULD MOVE OR CHANGE THINGS THE FASTEST? WHICH COULD MOVE OR CHANGE THINGS THE SLOWEST? LET'S DO AN EXPERIMENT TO FIND IF OUR PREDICTIONS ARE RIGHT. Divide the class into groups of two and distribute two petri dishes and two spoons to each group.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
OULD I HAVE TO DO TO GIVE THE TAP WATER EAT ENERGY?	Students: --recall from the cork popping demonstration in Activity 3-2 that more heat would provide more energy and, therefore, reply, "Heat it up."
placing these two beakers next to the one that and say: SOME WATER BOILING ON THE HOT PLATE. to the boiling water.)	
MAKE SOME PREDICTIONS. DOES ANYONE KNOW PREDICTION IS?	--respond, "A guess," "Trying to figure out what's going to happen."
OF THE THREE BEAKERS OF WATER HAS THE NERGY?	--recall the relationship between the amount of heat and energy and state that the beaker of boiling water has more energy.
OF THE THREE TEMPERATURES OF WATER COULD R CHANGE THINGS THE FASTEST? WHICH COULD R CHANGE THINGS THE SLOWEST?	--recall the relationship between energy and movement or change and predict boiling water and ice water respectively.
DO AN EXPERIMENT TO FIND IF OUR PREDICTIONS GHT. class into groups of two and distribute two s and two spoons to each group.	

DISTRIBUTE MATERIALS

ACTIVITY 3-3

MATERIALS	TEACHING STRATEGIES
	Say: IF WE FILLED ONE OF THE DISHES WITH BOILING WATER AND THE OTHER WITH ICE WATER, AT WHAT TEMPERATURE OF WATER WOULD A CHEMICAL MOVE THROUGH THE WATER THE FASTEST? Before distributing crystals, say: DO NOT PICK UP YOUR SPOON, OR PUT ANYTHING INTO THE DISHES UNTIL I TELL YOU TO. Pour a small amount of potassium permanganate into a petri dish, beaker, or small jar. Distribute to each student a crystal of potassium permanganate by using the tweezers to place a crystal in the student's spoon. It is important that the crystals going to the members of each team be about the same size. I HAVE GIVEN YOU SOME CRYSTALS OF A PURPLE CHEMICAL THAT WE ARE GOING TO USE. THEY ARE POISONOUS AND WILL CAUSE STAINS, SO DO NOT TOUCH THEM OR PICK THEM UP. AFTER I PASS OUT THE CRYSTALS, YOU WILL PUT THEM IN YOUR DISHES OF HOT AND COLD WATER. WHEN DOING THIS DO NOT BUMP THE DISH OR STIR THE WATER. WHAT DO YOU THINK WOULD HAPPEN IF YOU DID BUMP IT? WE WILL FILL ONE DISH WITH ICE WATER AND ONE DISH WITH BOILING WATER. AFTER THE WATER IS POURED I WILL GIVE YOU A SIGNAL TO DROP THE CRYSTAL INTO THE CENTER OF THE DISH. DO NOT DROP THE CRYSTAL INTO THE DISH UNTIL I TELL YOU TO. TRY TO DROP THE CRYSTAL AS CLOSE TO THE CENTER OF THE DISH AS POSSIBLE.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
LLED ONE OF THE DISHES WITH BOLING WATER OTHER WITH ICE WATER, AT WHAT EMPERATURE WOULD A CHEMICAL MOVE THROUGHTHE WATER EST?	--recall the relationships between heat, energy, and movement and predict that the hottest water will cause the greatest movement.
buting rystals, say: ICK UP YOUR SPOON, OR PUT ANYTING INTO ES UNTIL I TELL YOU TO. amount of potassium permanganae into a petri or small jar. Distribute to ach student a tassium permanganate by using he tweezers ystal in the student's spoon. It is impor- crystals going to the membersof each team same size.	
IVEN YOU SOME CRYSTALS OF A PUPLE THAT WE ARE GOING TO USE. THY ARE S AND WILL CAUSE STAINS, SO DONOT EM OR PICK THEM UP. AFTER I PSS CRYSTALS, YOU WILL PUT THEM INYOUR F HOT AND COLD WATER. WHEN DONG THIS UMP THE DISH OR STIR THE WATER.	
YOU THINK WOULD HAPPEN IF YOU ED	--predict it would move the crystal around or in some way disturb the experiment.
FILL ONE DISH WITH ICE WATER AN ONE H BOILING WATER. AFTER THE WRER IS WILL GIVE YOU A SIGNAL TO DROPTHE NTO THE CENTER OF THE DISH. D NOT CRYSTAL INTO THE DISH UNTIL I ELL TRY TO DROP THE CRYSTAL AS CLGE TO ER OF THE DISH AS POSSIBLE.	

MATERIALS	TEACHING STRATEGIES
	Before filling the dishes ask: WHAT ARE WE TRYING TO FIND OUT BY DOING THIS EXPERIMENT? Now completely fill the dishes with water by having a student fill one dish per team with ice water and the teacher fill the other dish with boiling water. Remind each student that he is "in charge" of one of the dishes, that he is responsible for observing, and that he will be responsible later for the data from that particular dish. When water has been distributed say: CAREFULLY PICK UP YOUR SPOONS. HOLD THEM JUST ABOVE THE WATER. AT MY SIGNAL DROP THE CRYSTAL IN THE VERY CENTER OF THE DISH. DROP THE CRYSTAL. Allow students to observe dishes for two or three minutes. Then ask: WHAT DO YOU SEE HAPPENING? If students have not indicated they notice a difference of dispersion in the two dishes, ask: IN WHICH DISH IS THE COLOR SPREADING THE FASTEST?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ng the dishes ask:	Students:
E WE TRYING TO FIND OUT BY DOING THIS ENT?	--recall that we are trying to find out what temperature has the most energy.
ly fill the dishes with water by having a one dish per team with ice water and the the other dish with boiling water. Remind that he is "in charge" of one of the dishes, esponsible for observing, and that he will le later for the data from that particular	
as been distributed say:	
LY PICK UP YOUR SPOONS. HOLD THEM JUST HE WATER. AT MY SIGNAL DROP THE CRYSTAL VERY CENTER OF THE DISH.	
E CRYSTAL.	--should drop crystal in water and observe color movement as crystal dissolves.
ts to observe dishes for two or three minutes.	
YOU SEE HAPPENING?	--respond, "The purple color is moving," "The color is spreading out," "It's moving," "It's melting," "It's spreading faster in the hot water."
students have not indicated they notice difference of dispersion in the two dishes, k:	
WHICH DISH IS THE COLOR SPREADING THE TEST?	--respond, "In the hot water."

ACTIVITY 3-3

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MATERIALS

Transparency 3-1

TEACHING STRATEGIES

WHY DOES IT MOVE FASTER IN THE HOT WATER?

Have students empty their dishes, being careful to rinse any remaining crystal out of the dish and try not to splash any on their clothes.

Place Transparency 3-1 of Worksheets 3-1 and 3-2 on the overhead projector and place a petri dish of water at room temperature on the concentric circles. Prepare to add a crystal of permanganate to the dish. If a wall clock with a second hand is not available obtain a wrist watch with a second hand.

Say:

> AFTER I DROP THE CRYSTAL IN THE WATER, LET'S WATCH TO SEE HOW LONG IT TAKES FOR THE COLOR TO MOVE OUT INTO THE DISH. WE WILL WATCH THE CLOCK AND AT THE END OF EACH MINUTE I WILL MARK WITH ONE OF THESE LETTERS (point to the letters on the circle) HOW FAR IT HAS MOVED FROM THE CENTER OF THE DISH. IF THE MOVEMENT IS NOT EVEN, LOOK FOR THE FARTHEST POINT THE COLOR HAS MOVED TO.

DEMONSTRATE

Proceed with the demonstration by placing a crystal in the center of the dish. After one minute has passed, ask:

> WHICH LINE IS THE COLOR CLOSEST TO?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Y DOES IT MOVE FASTER IN THE HOT WATER?	Students: --recall the relationship between heat energy and movement and conclude, "Because the hot water has more energy."
s empty their dishes, being careful to rinse g crystal out of the dish and try not to splash clothes. arency 3-1 of Worksheets 3-1 and 3-2 on the jector and place a petri dish of water at room on the concentric circles. Prepare to add a ermanganate to the dish. If a wall clock with d is not available obtain a wrist watch with d. DROP THE CRYSTAL IN THE WATER, LET'S SEE HOW LONG IT TAKES FOR THE COLOR OUT INTO THE DISH. WE WILL WATCH THE ND AT THE END OF EACH MINUTE I WILL MARK E OF THESE LETTERS (point to the letters circle) HOW FAR IT HAS MOVED FROM THE OF THE DISH. IF THE MOVEMENT IS NOT OOK FOR THE FARTHEST POINT THE COLOR HAS D.	
the demonstration by placing a crystal in the e dish. After one minute has passed, ask: NE IS THE COLOR CLOSEST TO?	--respond with probably A or B.

MATERIALS	TEACHING STRATEGIES
	SINCE THE COLOR IS CLOSEST TO LINE (A) WE WILL MARK DOWN THE LETTER "A" AFTER ONE MINUTE HERE. Fill in the appropriate space on the transparency. Continue to record data in a like manner for the next three to four minutes. Now say: THIS WATER I JUST USED IS TAP WATER AT ROOM TEMPERATURE. IT'S NOT VERY HOT OR COLD. Point to the boiling water and ask: IS IT HOTTER OR COLDER THAN THIS WATER? SINCE THIS IS TAP WATER AT ROOM TEMPERATURE, IT'S NOT VERY HOT OR COLD. WHAT WILL HAPPEN IF WE PUT THE CRYSTAL IN THE HOT WATER? RAISE YOUR HAND IF YOU THINK THE COLOR WILL MOVE FASTER IN THE COLD WATER. RAISE YOUR HAND IF YOU THINK THE COLOR WILL MOVE FASTER IN THE HOT WATER. Record on the board the number of students who predict the color will move faster in cold water and the number who predict it will move faster in hot. This can be an indication to you if the students are following along and understanding the procedure. Now ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
THE COLOR IS CLOSEST TO LINE (A) WE ARK DOWN THE LETTER "A" AFTER ONE MINUTE	
appropriate space on the transparency. Con- cord data in a like manner for the next three nutes.	
ATER I JUST USED IS TAP WATER AT ROOM ATURE. IT'S NOT VERY HOT OR COLD.	
e boiling water and ask:	
HOTTER OR COLDER THAN THIS WATER?	--respond, "Colder."
THIS IS TAP WATER AT ROOM TEMPERATURE, OT VERY HOT OR COLD.	
ILL HAPPEN IF WE PUT THE CRYSTAL IN THE TER?	--predict, "It will move faster."
YOUR HAND IF YOU THINK THE COLOR WILL ASTER IN THE COLD WATER.	--no one should raise hands.
YOUR HAND IF YOU THINK THE COLOR WILL ASTER IN THE HOT WATER.	--all should raise hands.
he board the number of students who predict ill move faster in cold water and the number it will move faster in hot.	
an indication to you if the students are long and understanding the procedure.	

ACTIVITY 3-3

30

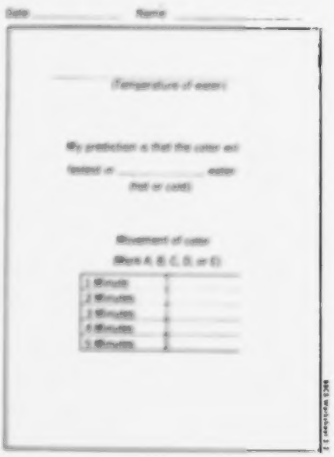
MATERIALS

Slide 3-1

Worksheet 3-1

Slide 3-2

Worksheet 3-2



TEACHING STRATEGIES

HOW CAN WE FIND OUT FOR SURE WHICH PREDICTION IS CORRECT?

Distribute Worksheets 3-1 and 3-2 to each student. Have each team designate one person to experiment with the hot water and one the cold water. Have students identify which temperature of water they are working with by marking hot or cold under the circle on the Worksheet 3-1 and marking hot or cold in the appropriate spot at the top of Worksheet 3-2. Have each student write his prediction in the appropriate place on Worksheet 3-2.

Distribute potassium permanganate crystals and water as before. Instruct the students to place their petri dish of water over the outline on Worksheet 3-1.

Again have students drop the crystals into the dishes at a given signal, emphasizing that they observe and record what happens in <u>their</u> own dishes.

After one minute say:

MARK ON YOUR WORKSHEET 3-2 NEXT TO ONE MINUTE, WHERE THE COLOR IS IN YOUR DISH.

It may be helpful to point out again the appropriate place on the worksheets where they are to record their data.

ACCEPT ALL ANSWERS

At each succeeding minute interval have students mark their worksheets. When students have finished observing and recording say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
WE FIND OUT FOR SURE WHICH PREDICTION IS	Students:
rksheets 3-1 and 3-2 to each student. Have ignate one person to experiment with the hot the cold water. Have students identify which f water they are working with by marking hot the circle on the Worksheet 3-1 and marking n the appropriate spot at the top of Worksheet ch student write his prediction in the appro- on Worksheet 3-2.	--suggest, "Putting the crystal in hot or cold water like we did before."
tassium permanganate crystals and water as ruct the students to place their petri dish the outline on Worksheet 3-1.	
udents drop the crystals into the dishes at 1, emphasizing that they observe and record in their own dishes.	--drop their crystals, and observe color movement.
ute say:	
YOUR WORKSHEET 3-2 NEXT TO ONE MINUTE, E COLOR IS IN YOUR DISH.	--mark appropriate letter on the worksheet.
pful to point out again the appropriate place eets where they are to record their data.	
ACCEPT ALL ANSWERS	
eding minute interval have students mark their When students have finished observing and :	

MATERIALS	TEACHING STRATEGIES
	COMPARE YOUR RECORD WITH YOUR PARTNER'S. IN WHICH DISH DID THE CHEMICAL MOVE FASTEST? WAS YOUR PREDICTION CORRECT? DID THE CHEMICAL MOVE FASTEST IN THE DISH YOU SAID IT WOULD? WHY DID THE CHEMICAL IN THE DISH WITH THE HOTTEST WATER MOVE THE MOST? WHICH DISH OF WATER STARTED WITH THE MOST ENERGY? WHICH WATER MADE THE CRYSTAL MOVE THE FASTEST? WHY DID THE COLD WATER MAKE THE CRYSTAL MOVE THE SLOWEST?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
RE YOUR RECORD WITH YOUR PARTNER'S. IN DISH DID THE CHEMICAL MOVE FASTEST?	Students: --compare worksheets and conclude that the color moved fastest in the hot water.
OUR PREDICTION CORRECT? DID THE CHEMICAL FASTEST IN THE DISH YOU SAID IT WOULD?	--check the validity of their predictions.
ID THE CHEMICAL IN THE DISH WITH THE ST WATER MOVE THE MOST?	--infer it had the most energy.
DISH OF WATER STARTED WITH THE MOST ENERGY?	--recall that the dish with the hottest water started with the most energy.
WATER MADE THE CRYSTAL MOVE THE FASTEST?	--respond, "The hot water."
ID THE COLD WATER MAKE THE CRYSTAL MOVE LOWEST?	--associate slower movement with a lesser amount of energy.

UNIT III, CORE A

ACTIVITY 3-3: "Experimenting With Heat Energy"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. On the second experiment with the crystals and hot and cold water (Worksheet 3-2), how many students predicted the color would move faster in the cold water? _____ students.

18. How many students had difficulty observing and recording results on Worksheet 3-2?
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Collect and send in student Worksheet 3-2.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A

ACTIVITY 3-3: "Experimenting With Heat Energy"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

MATERIALS

Slide 3-3
Worksheet 3-3 (Front)
*2 Tea bags

(Continued on next page)

*Not furnished in materias kit

TEACHING STRATEGIES

Activity 3-4. Hot Or Cold -- A Review Of Success

The purpose of the demonstration is to assess the success of Activity 3-3. It will help make the student aware of what he has learned and provides you an opportunity to reinforce his success through praise.

Pass out Worksheet 3-3 and direct each student to write his name on it. Have ready hot water and cold water, two medium size beakers or clean glasses, and two tea bags. Write on the chalkboard the words "hot" and "cold."

Now say:

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-4. HOT OR COLD -- A REVIEW OF SUCCESS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

TEACHING STRATEGIES

-4. Hot Or Cold -- A Review Of Success

e of the demonstration is to assess the success y 3-3. It will help make the student aware of s learned and provides you an opportunity to his success through praise.

orksheet 3-3 and direct each student to write n it. Have ready hot water and cold water, size beakers or clean glasses, and two tea te on the chalkboard the words "hot" and "cold."

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have correctly predicted which of the two beakers of tea would be ready first.
--have observed the demonstration and compared the results with his prediction.
--understand why his prediction was correct (or incorrect).
--have inferred water temperature from movement of crystal color in the water.

ACTIVITY 3-4

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MATERIALS

*Hot and cold water
2 Pyrex beakers
*Vapor
*35mm slide projector
Slide 3-3
Worksheet 3-3 (Back)

*Not furnished in materials kit

TEACHING STRATEGIES

I AM GOING TO FIX MYSELF SOME TEA IN THESE TWO BEAKERS. IN ONE I WILL POUR COLD WATER AND IN THE OTHER I WILL POUR HOT WATER. IN THIS SPACE ON THE BACK OF YOUR WORKSHEET WRITE THE WORD "HOT" (points to the word on the chalkboard) IF YOU THINK THE HOT TEA WILL BE READY FIRST OR WRITE THE WORD "COLD" (again points) IF YOU THINK THE COLD TEA WILL BE READY FIRST.

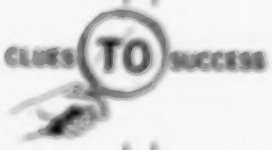
Then say:

I ALSO WANT YOU TO WRITE WHY YOU HAVE PREDICTED "HOT" OR WHY YOU HAVE PREDICTED "COLD."

Assist students in their writing where necessary.

Add water and tea to the beakers.

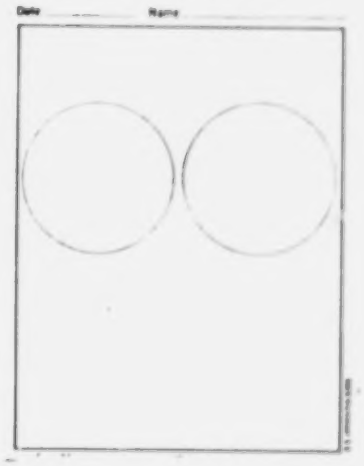
While waiting for the tea to diffuse through the water, continue with the following.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
NG TO FIX MYSELF SOME TEA IN THESE TWO IN ONE I WILL POUR COLD WATER AND IN R I WILL POUR HOT WATER. IN THIS SPACE ACK OF YOUR WORKSHEET WRITE THE WORD oint to the word on the chalkboard) IF K THE HOT TEA WILL BE READY FIRST OR WRITE "COLD" (again point) IF YOU THINK THE WILL BE READY FIRST.	--write "hot" or "cold" on their papers.
ANT YOU TO WRITE WHY YOU HAVE PREDICTED WHY YOU HAVE PREDICTED "COLD."	--explain in writing why "hot" or "cold" was predicted.
te in their writing where necessary.	
tea to the beakers.	
for the tea to diffuse through the water, the following.	
	

MATERIALS

*Overhead projector
Transparency 3-2
2 Petri dishes
2 Crystals of potassium permanganate
1 Pair of tweezers
2 Pyrex beakers
*Cold and hot water

Transparency 3-2



*Not furnished in materials kit

TEACHING STRATEGIES

Project Transparency 3-2 and place two petri dishes on the transparency. Stand between the students and the overhead projector, or place something between it and the students so they cannot observe which of the dishes you fill with hot or cold water. Fill one petri dish with hot water and the other with cold. Place equal-sized crystals in each dish and instruct the students to observe the movement. While students are observing crystal movement, ask them to turn Worksheet 3-3 over to the front.

After the students have observed for a moment or two, (2 - 3 minutes), ask them to mark an X on the dish which has the warmest water in it. (An alternative may be to write the words "hot" or "cold" on the chalkboard and to have the students write these words in the circles to indicate their predictions.)

Collect worksheets. Quickly note which students, if any, made incorrect predictions.

Now ask:

WHICH DISH HAS THE WARMER WATER IN IT?

WHY DO YOU THINK IT IS THE WARMER?

HOW COULD YOU FIND OUT FOR SURE IF IT IS THE WARMER?

IN WHICH DISH WILL THE COLOR REACH THE EDGE FIRST?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ansparency 3-2 and place two petri dishes on the cy. Stand between the students and the over- ctor, or place something between it and the o they cannot observe which of the dishes you hot or cold water. Fill one petri dish with hot the other with cold. Place equal-sized crystals sh and instruct the students to observe the move- le students are observing crystal movement, ask rn Worksheet 3-3 over to the front.	Students:
students have observed for a moment or two, utes), ask them to mark an X on the dish which rmest water in it. (An alternative may be to words "hot" or "cold" on the chalkboard and to tudents write these words in the circles to heir predictions.)	--mark worksheets.
rksheets. Quickly note which students, if any, rect predictions.	
DISH HAS THE WARMER WATER IN IT?	--predict which has the warmer water based upon the rate of diffusion (movement of color).
O YOU THINK IT IS THE WARMER?	--infer that since it has moved the most it must be the warmer.
OULD YOU FIND OUT FOR SURE IF IT IS ARMER?	--respond, "Feel it," "Stick my finger in it," "Use a thermometer."
ICH DISH WILL THE COLOR REACH THE FIRST?	--predict that the fastest moving color will get there first; that the color will reach the edge first in the dish with the hottest water.

ACTIVITY 3-4

MATERIALS

TEACHING STRATEGIES

Make a special effort to involve in the discussion those students who had incorrect predictions on their worksheet. If a majority of students predicted incorrectly you may need to spend more time on this. In any event, have them verify their inference by measuring the temperature of the water.

Ask:

WHAT WORK ARE WE WATCHING THE HEAT ENERGY DO?

Then return attention to the tea bags.

Now say:

WAS YOUR PREDICTION ABOUT THE TEA CORRECT?

WHY WAS THE TEA IN THE HOT WATER READY FIRST?

When the class period has been completed, read each student's prediction and explanation. If it appears that the majority of students do not understand the concept clearly, review the activity with them before proceeding.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ial effort to involve in the iscussion those o had incorrect predictions o their worksheet. ty of students predicted incorrectly you may nd more time on this. In any event, have them r inference by measuring the emperature of the	--recall the temperature measuring skill in Unit I and apply it here for measuring and recording the water temperature of each dish.
ORK ARE WE MATCHING THE HEAT NERGY DO? attention to the tea bags.	--respond, "Move the chemical," "Melt the chemical."
UR PREDICTION ABOUT THE TEA CORRECT?	--respond, "Yes."
THE TEA IN THE HOT WATER READY FIRST?	--respond, "The hot water had the most energy and could therefore do the work fastest."
ass period has been completed, read each rediction and explanation. If it appears that of students do not understand the concept view the activity with them before proceeding.	

Teacher _____

Date _____

UNIT III, CORE A
TALLYSHEET 3-1: Tally of Worksheet 3-3
ACTIVITY 3-4: "Hot Or Cold (Review Of Success)"

The sequence of activities in Core A have been dealing with the relationship of the amount of energy available and the speed with which work can be done. The prediction in column 1 deals with the student's awareness that more energy is present. The prediction in column 3 relates work done to the presence of more energy. Column 2 rates the student's ability to verbalize this understanding. It is not expected that all students will be able to explain why, but they should have many opportunities to try to verbalize their ideas. At this point most students should be able to make correct predictions. Their performance should indicate whether a general review is needed or a few students need special help.

Column 1. Prediction of Tea Making. Indicate each student's prediction of which container of tea will be ready first by circling Hot or Cold in column 1.

Column 2. Explanation of Prediction. Rate each student's explanation of why he predicted hot or cold tea using the following categories:
None: no explanation given or does not make sense.
Weak: explanation is vague or misses the point that the hotter the water the faster work will be done.
Good: explanation includes the ideas that hotter means more energy and faster work.

Column 3. Prediction of Temperature. Circle Right or Wrong to indicate the correctness of each student's prediction of the container that has the warmest water in it.

		1 Tea Making		2 Explanation	3 Prediction of Temperature	
Attach ID list here.	01	Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong

____ Weak: explanation is vague or misses the point that the hotter the water the faster work will be done.

Good: explanation includes the ideas that hotter means more energy and faster work.

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		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
		Hot	Cold	None Weak Good	Right	Wrong
TOTALS:		____	____	____ ____ ____	____	____

UNIT III, CORE A

ACTIVITY 3-4: "Hot Or Cold" (Review Of Success)

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Please complete Tallysheet 3-1 and send it in with this feedback sheet. Also send in all student Worksheets 3-3.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A

ACTIVITY 3-4: "Hot Or Cold" (Review Of Success)

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

MATERIALS	TEACHING STRATEGIES
	Activity 3-5. The Energy Wheel *Through review and experimentation the student will reinforce the concept that heat can cause work to be done and therefore is a form of energy. The student will see that the ability to change something or to cause movement requires energy. The equipment construction and experimentation will reinforce the student's confidence in his own judgment and provide success experiences.* *The use of the burning candles provides an opportunity for the discussion of the variety of fuels used by the students and their families (coal, oil, or gas for heating homes; gasoline for cars). The students are asked to begin thinking about what kinds of things supply energy and the finiteness of these resources.*

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-5. THE ENERGY WHEEL

OCUS FOR THIS ACTIVITY

OALS:

. Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

. Recognize that the ability tomove or cause movement requires energy.

. Recognize that the amount of nd the rate at which work is done is relaed to the amount of energy input.

. Recognize different forms of nergy (heat, light, chemical, and ebctrical).

TEACHING STRATEGIES

. The Energy Wheel

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the burning candles provides an oportunity cussion of the variety of fuels used by the d their families (coal, oil, or gs for heating line for cars). The students are asked to ing about what kinds of things suply energy teness of these resources.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have constructed a pinwheel.
--have used heat from the candles to make the pinwheel turn.
--have made predictions about the speed of the turning pinwheel as a result of varying the number of candles or the distance of the candle(s) from the wheel.
--have done experiments to check predictions.
--be able to explain that the candle supplied the heat energy that turned the pinwheel.
--list alternate forms of energy which might cause the pinwheel to work.
--infer and predict the present and future availability of fuels which supply energy.

ACTIVITY 3-5

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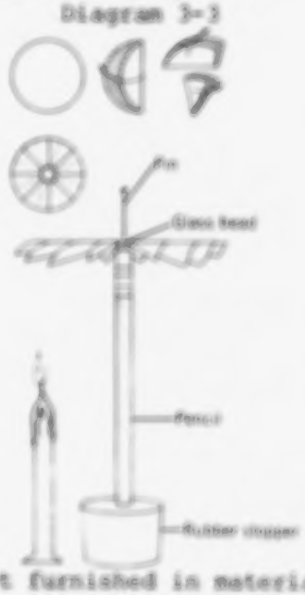
MATERIALS

*Heavy-duty aluminum foil
*Large size birthday candles (2 per student)
*Pencil with eraser (1 per student)
*Straight pin (1 per student)
*Scissors (1 per student)
1 Glass bead per student
Rubber stopper with holes (1 per student), Size 8
*Matches
*Cardboard or heavy paper
*Quarter
Worksheet 3-4
Slides 3-4 through 3-7
*35mm Slide projector

Diagram 3-3



*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Preparation and organization of the materials is very important to the success of this activity. The teacher should construct in advance a pinwheel to be used as a demonstration model. Know that it works before using it with the class! Prepare ahead of time the foil circles by tracing and cutting around a petri dish on heavy-duty aluminum foil. Sheets or pieces of cardboard or heavy paper should be available for the student to set the candles and pinwheel apparatus on. This prevents wax from dropping onto the table surface.

2. Water should be handy to extinguish any accidental fires.

3. The design suggested has been tested and should work regularly. However, you and your students might want to experiment with different designs; you might find one that works better.

Now ask:

CAN ANYONE THINK OF ANY OTHER MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK?

Now say:

YOU HAVE NAMED SOME MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK. WE'RE NOW GOING TO MAKE OUR OWN MACHINE.

Help the students to construct their own pinwheel by using the following directions. See Diagram 3-3.

TEACHING STRATEGIES

ration:

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portant to the success of this activity. The
should construct in advance a pinwheel to
l as a demonstration model. Know that it
efore using it with the class! Prepare
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Sheets or pieces of cardboard or heavy paper
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NE THINK OF ANY OTHER MACHINES THAT USE
RGY TO MAKE THEM WORK?

NAMED SOME MACHINES THAT USE HEAT
O MAKE THEM WORK. WE'RE NOW GOING
OUR OWN MACHINE.

ents to construct their own pinwheel by using
directions. See Diagram 3-3.

ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Stove," "Car," "Furnace," "Welding torch," "Iron," "Dryer," "Gun."

MATERIALS	TEACHING STRATEGIES
	1. Supply the circle which has already been cut to the size of a petri dish from aluminum foil. 2. Fold the aluminum foil circle three times -- into halves, fourths, and eighths. 3. Unfold the circle and place a quarter in the center of the circle. Trace around the quarter with a pencil. 4. Cut along the lines of the circle that correspond to the crossed lines of the diagram, and stop at the small circle made by tracing the quarter. 5. Fold down the left side of each of the eight leaves produced by cutting, as in the diagram or model. 6. With a straight pin through the center of the wheel, mount the wheel to a pencil eraser, inserting a small glass bead between the wheel and the eraser. See Diagram 3-1. It is important to include a glass bead to reduce the friction between the eraser and the wheel. 7. Support the machine in an upright position by pushing the pencil into the hole of the rubber stopper. 8. Starting with only one lighted birthday candle, hold or place the candle under the wheel in such a position that it causes the wheel to start to move. Hint: Any or all wheels may not turn because of one or more of the following conditions.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
the circle which has already been cut to e of a petri dish from aluminum foil.	
e aluminum foil circle three times -- into fourths, and eighths.	
the circle and place a quarter in the of the circle. Trace around the quarter pencil.	
ng the lines of the circle that correspond crossed lines of the diagram, and stop at ll circle made by tracing the quarter.	
wn the left side of each of the eight leaves d by cutting, as in the diagram or model.	
straight pin through the center of the wheel, he wheel to a pencil eraser, inserting a lass bead between the wheel and the eraser. gram 3-3. It is important to include a ead to reduce the friction between the and the wheel.	
the machine in an upright position by the pencil into the hole of the rubber	
g with only one lighted birthday candle, place the candle under the wheel in such a n that it causes the wheel to start to move.	--construct heat wheels and make them work.
all wheels may not turn because of one or f the following conditions.	

ACTIVITY 3-5

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MATERIALS	TEACHING STRATEGIES
	1. Candle too small or one candle not enough. (It may be necessary to add another candle to get initial movement.) 2. Length of pencil is too long. 3. Air drafts in the room counter the effect of the heat. 4. Pin may not be through the center of the wheel. 5. Blades bent improperly. It may be necessary to change one or more of the above conditions in order for the wheel to turn freely. WORK TIME SAVE THE PINWHEEL FOR Once the students have their wheels working, the teacher, with small groups or individuals, should suggest: SEE IF YOU CAN DISCOVER A WAY TO MAKE THE WHEEL GO FASTER. Check individual progress. As students discover one way of increasing speed, ask them to explain why, and then suggest they try to find another way.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
dle too small or one candle not enough. may be necessary to add another candle get initial movement.)	Students:
gth of pencil is too long.	
drafts in the room counter the effect the heat.	
may not be through the center of the wheel.	
dles bent improperly.	
essary to change one or more of the above order for the wheel to turn freely.	

WORK TIME

GIVE THE FOLLOWING FOR LATER ACTIVITY

nts have their wheels working, the teacher, ups or individuals, should suggest:	
OU CAN DISCOVER A WAY TO MAKE THE WHEEL k.	--experiment with such things as more candles, candles higher, or bigger candles to try to make the heat wheel go faster.
ual progress.	
iscover one way of increasing speed, ask them , and then suggest they try to find another	--perform experiments and check predictions.

MATERIALS	TEACHING STRATEGIES
	 When the students have completed their experiments, ask: WHO CAN TELL ME HOW THIS MACHINE WORKS? WHO WAS ABLE TO MAKE IT GO FASTER? WHY DID IT GO FASTER? You should expect in these last two explanations such concepts as: candle burning produced heat; heat is energy; energy caused the machine to turn; more heat makes it go faster. If these concepts are not reached, relate the working of this machine to previous heat-energy experiments where heat did the work of moving the potassium permanganate and popping the cork. Then ask: ARE THERE ANY OTHER WAYS WE CAN MAKE OUR PIN-WHEELS TURN BESIDES USING BURNING CANDLES?

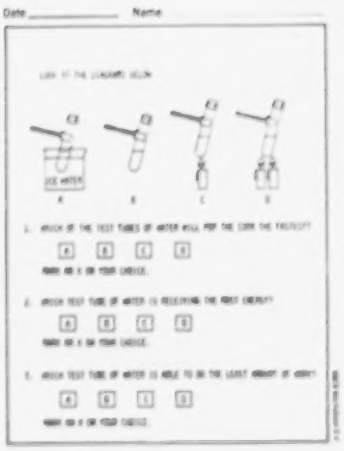
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
WORK TIME	
dents have completed their experiments, ask:	
TELL ME HOW THIS MACHINE WORKS?	--identify the components that make the machine work and conclude that the candles are providing heat and the heat energy is causing the wheel to turn (to work).
ABLE TO MAKE IT GO FASTER?	
IT GO FASTER?	--indicate that adding more heat would add more energy and therefore make the wheel spin faster.
xpect in these last two explanations such candle burning produced heat; heat is energy; d the machine to turn; more heat makes it go	
HAVE YOU INVOLVED ALL STUDENTS?	
cepts are not reached, relate the working of to previous heat-energy experiments where work of moving the potassium permanganate the cork.	
E ANY OTHER WAYS WE CAN MAKE OUR PIN-TURN BESIDES USING BURNING CANDLES?	--respond, "Yes," "No," "I don't know."

ACTIVITY 3-5

42

MATERIALS

Worksheet 3-4



TEACHING STRATEGIES

Have students test their ideas.

EXPERIMENTATIO

Now ask:

> WHAT OTHER THINGS DO PEOPLE BURN OR USE TO GET ENERGY TO MAKE MACHINES WORK?

Help students to list on the chalkboard the fuels most commonly used by man. (Coal, wood, oil, gasoline, natural gas, and, if mentioned by students, atomic fuel.)

> LET'S SEE HOW MANY WAYS WE CAN LIST THAT MAN USES THE ENERGY HE GETS FROM THESE FUELS. HOW ABOUT STARTING WITH (heating a house, cooking food, etc.). WHO CAN GIVE US ANOTHER USE?

Continue to elicit responses from students to develop a list of uses for each fuel.

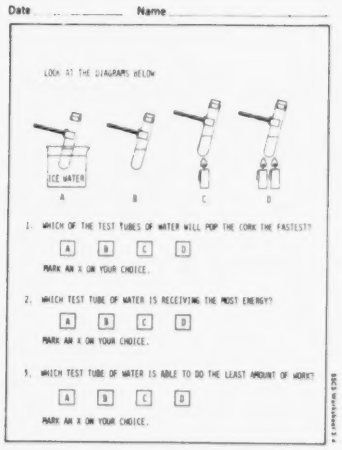
> DO YOU THINK THERE ARE ENOUGH FUELS AVAILABLE TODAY FOR MAN TO DO ALL THE WORK HE WANTS AND NEEDS TO DO?
>
> DO YOU THINK THERE IS ENOUGH GASOLINE FOR ALL THE CARS, TRUCKS, BUSES, AIRPLANES, AND MOTOR-CYCLES BEING USED TODAY?

Discuss as interest warrants.

NOTE: These questions are intended to get the student to begin thinking about the finiteness of resources rather than to arrive at a definite conclusion at

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ts test their ideas.	Students: --cause wheels to turn by pushing with fingers, blowing, burning paper, burning other materials.
EXPERIMENTATION TIME	
THER THINGS DO PEOPLE BURN OR USE TO ERGY TO MAKE MACHINES WORK?	--respond, "Coal," "Wood," "Gas," "Oil," "Electricity."
ts to list on the chalkboard the fuels most ed by man. (Coal, wood, oil, gasoline, natural f mentioned by students, atomic fuel.)	
SEE HOW MANY WAYS WE CAN LIST THAT MAN HE ENERGY HE GETS FROM THESE FUELS. HOW STARTING WITH (heating a house, cooking etc.). WHO CAN GIVE US ANOTHER USE?	--respond with suggested uses for fuels, such as to keep warm, transportation, factories, etc.
elicit responses from students to develop a s for each fuel.	
THINK THERE ARE ENOUGH FUELS AVAILABLE FOR MAN TO DO ALL THE WORK HE WANTS AND TO DO?	--respond, "Yes," "No," "I don't know."
THINK THERE IS ENOUGH GASOLINE FOR ALL RS, TRUCKS, BUSES, AIRPLANES, AND MOTOR- BEING USED TODAY?	--respond, "Yes," "No," "I don't know," "Maybe," "Just go down to the gas station."
interest warrants.	
questions are intended to get the student to thinking about the finiteness of resources r than to arrive at a definite conclusion at	

MATERIALS


Date _____ Name _____

LOOK AT THE DIAGRAMS BELOW

1. WHICH OF THE TEST TUBES OF WATER WILL POP THE CORK THE FASTEST?

A B C D

MARK AN X ON YOUR CHOICE.

2. WHICH TEST TUBE OF WATER IS RECEIVING THE MOST ENERGY?

A B C D

MARK AN X ON YOUR CHOICE.

3. WHICH TEST TUBE OF WATER IS ABLE TO DO THE LEAST AMOUNT OF WORK?

A B C D

MARK AN X ON YOUR CHOICE.

Slide 3-4

TEACHING STRATEGIES

this time. This concept of conserving non-renewable resources will be developed at a later time.

Unless the students have already concluded there is a definite shortage of fuels, ask:

DO YOU BELIEVE THAT THERE WILL BE ENOUGH OF THESE FUELS IN 10 YEARS, IN 50 YEARS, IN 100 YEARS, FOREVER? DO YOU FEEL WE WILL ALWAYS HAVE ENOUGH FUELS TO SUPPLY OUR ENERGY NEEDS?

ACCEPT ANSWE

Ask the students to give the reasons for their opinions.

CLUES TO

At this point hand out Worksheet 3-4. Ask the students not to discuss the clues with each other, but to mark on their worksheets as you project and read the questions. Project Slide 3-4. Slowly read the instructions and ask different students to describe each of the four diagrams.

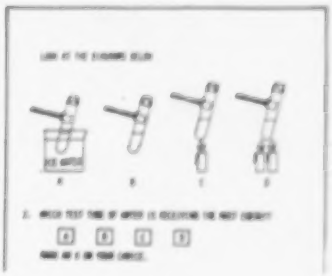
Then read the questions and provide ample time for the students to mark an "X" on their choices.

When you see that all students have made a choice, project Slide 3-5. Again draw attention to the diagrams and read the question.

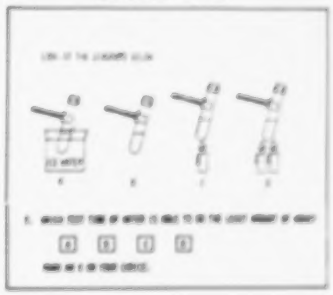
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
s time. This concept of conserving non-renewable ources will be developed at a later time.	
students have already concluded there is a ortage of fuels, ask:	
J BELIEVE THAT THERE WILL BE ENOUGH OF FUELS IN 10 YEARS, IN 50 YEARS, IN 100 FOREVER? DO YOU FEEL WE WILL ALWAYS ENOUGH FUELS TO SUPPLY OUR ENERGY NEEDS?	--give their opinions.
ACCEPT ALL ANSWERS	
dents to give the reasons for their opinions.	
CLUES TO SUCCESS	
nt hand out Worksheet 3-4. Ask the students uss the clues with each other, but to mark rksheets as you project and read the questions. de 3-4. Slowly read the instructions and ask tudents to describe each of the four diagrams.	--inspect Diagrams A, B, C, and D and describe the components in each.
he questions and provide ample time for the mark an "X" on their choices.	--mark an "X" on choice D.
e that all students have made a choice, project Again draw attention to the diagrams and read h.	

MATERIALS

Slide 3-5



Slide 3-6



TEACHING STRATEGIES

NOTE: This appears as Question 2 on Worksheet 3-4.

GIVE STUDENTS TIME TO THINK

Project Slide 3-6. Again read the question and give the students ample time to mark a choice. This question appears as number 3 on Worksheet 3-4.

GIVE STUDENTS TIME TO THINK

Ask the students to turn Worksheet 3-4 over. Project Slide 3-7. Read the question twice.

GIVE STUDENTS TIME TO THINK

Then collect the worksheets.

After collecting the papers use Tallysheet 3-2 to see if any questions were missed by most of the class, if any one student missed most of the questions, or if any gross irregularities showed up in some student's answers.

If many students missed any particular question, it will most likely need to be reviewed and discussed. If one student missed many questions, he probably will need special attention in reviewing the concepts covered. If there were irregularities present which might indicate

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ppears as Question 2 on Worksheet 3-4.	--will mark an "X" on choice D.
GIVE STUDENTS TIME TO THINK	
3-6. Again read the question and give the time to mark a choice. This question mber 3 on Worksheet 3-4.	--will mark an "X" on choice A.
GIVE STUDENTS TIME TO THINK	
nts to turn Worksheet 3-4 over. Project ead the question twice.	--will mark an "X" on the second beaker.
GIVE STUDENTS TIME TO THINK	
the worksheets.	
ing the papers use Tallysheet 3-2 to see if were missed by most of the class, if any issed most of the questions, or if any gross showed up in some student's answers.	
nts missed any particular question, it will ed to be reviewed and discussed. If one many questions, he probably will need spe- in reviewing the concepts covered. If regularities present which might indicate	

MATERIALS

Slide 3-7

TEACHING STRATEGIES

illogical thinking or guessing. This might also need attention. Save the tabulation for use later on in this case.

Project each slide in turn and ask the students to discuss each.

Slide 3-4, question 1.

Slide 3-5, question 2.

Slide 3-6, question 3.

Slide 3-7, question 4.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS	ACTIVITY 3-4
...ing or guessing, this might also need atten- ...he tabulation for use later on in this core.	Students:	
...slide in turn and ask the students to discuss		
...estion 1.	==will compare the four diagrams and note that "D" has two candles under the test tube and predict that it will pop the cork fastest.	
...estion 2.	==will equate the burning of the candles with energy release and state that two candles will supply more energy to the water.	
...estion 3.	==will infer that ice water has the least energy to release and will therefore cause test tube A to do the least work.	
...estion 4.	==will compare the four diagrams and correctly read the four thermometers, equate the highest thermometer reading (D) with the greatest amount of energy, associate energy with the ability to move a crystal, and infer that the greater the energy the more rapid the movement.	

Number _____

Date _____

UNIT III, CORE A
TALLYHEET 3-2: Tally of Worksheet 3-5
ACTIVITY 3-3: "The Energy Wheel"

Tabulate each student's responses to the four questions on Worksheet 3-5. Performance on the first three questions should be high. Praise your students' success. Question 4 may reveal the need to revise the activities in this core and the activities in Unit I, Core A, on reading a thermometer. If only a few students have been unsuccessful, provide individual help and continue with Activity 3-4.

		1 (Pop cork)	2 (Boat energy)	3 (Lunch work)	4 (Fastest color)
	SET:	A B C D	A B C D	A B C D	A B C D
Attach ID list here.	01	A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D
		A B C D	A B C D	A B C D	A B C D

A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
A B C D	A B C D	A B C D	A B C D
TOTALS: ___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___	___ ___ ___ ___

Does this review give an accurate indication of student understanding? ☐ Yes ☐ No

If not, what other evidence do you have of student learning?

Teacher _____

Date _____

UNIT III, CORE A
TALLYSHEET 3-2: Tally of Worksheet 3-4
ACTIVITY 3-5: "The Energy Wheel"

Tabulate each student's responses to the four questions on Worksheet 3-4. Performance on the first three questions should be high. Praise your students' success. Question 4 may reveal the need to review the activities in this core and the activities in Unit I, Core B, on reading a thermometer. If only a few students have been unsuccessful, provide individual help and continue with Activity 3-6.

	1 (Pop cork)	2 (Most energy)	3 (Least work)	4 (Fastest pulse)
KEY:	A B C (D)	A B C (D)	(A) B C D	A (B) C D
Attach ID list here. 01	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D

	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
	A B C D	A B C D	A B C D	A B C D
TOTALS:	____ ____ ____ ____	____ ____ ____ ____	____ ____ ____ ____	____ ____ ____ ____

Does this review give an accurate indication of student understanding? ☐ Yes ☐ No
If not, what other evidence do you have of student learning?

UNIT III, CORE A

ACTIVITY 3-5: "The Energy Wheel"

Activity name suggested by class: _____

Teacher: Week Use: Four ____ Twice ____ Four ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

	(Number)	Name students
HIGH INTEREST		
MODERATE INTEREST		
INDIFFERENCE		
MODERATE RESISTANCE		
STRONG DISLIKE		
HARD TO RATE		

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Worksheet #	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Transparency #	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. How many students could not get their pinwheel to work?
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Explain the problem:

18. Did any student give away the answer to any question on Worksheet 3-4?
☐ No ☐ Yes: Comment.

19. Complete Tallysheet 3-2 and send in with this feedback sheet.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A
ACTIVITY 3-5: "The Energy Wheel"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

MATERIALS

TEACHING STRATEGIES

Activity 3-6. Chemical Energy

In this activity the student observes that chemical energy, like any other form of energy, can be used to do work. The concept that energy does not have to be used immediately, i.e., that energy can be stored, is identified. This activity lays the groundwork for a later series of experiments which will culminate with identifying food as a source of chemical energy.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-6. CHEMICAL ENERGY

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

TEACHING STRATEGIES

3-6. Chemical Energy

ctivity the student observes that chemical ike any other form of energy, can be used to do concept that energy does not have to be used ty, i.e., that energy can be stored, is identi- is activity lays the groundwork for a later experiments which will culminate with identi- l as a source of chemical energy.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have observed and performed the Alka-Seltzer and variable liquid experiment.
--have completed Worksheet 3-5.
--be able to state that chemicals store energy.
--realize that different chemicals store different amounts of energy.
--be able to predict that Alka-Seltzer will react more vigorously as the temperature of the system increases.
--have performed the Alka-Seltzer and water temperature experiment.
--be able to equate the bubbling and movement observed in the experiment with the release of energy.

ACTIVITY 3-6

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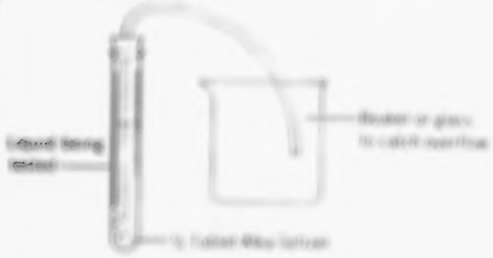
MATERIALS

*1 Pinwheel and candle apparatus (constructed in the previous activity)
*Detergent solution for washing test tubes
Per pair of students:
1 Test tube (25 X 300 mm)
Rubber stopper (#4), one-hole
Plastic tubing (3/16" inside diameter, 5/16" outside diameter), 18" long
Beaker (400 ml)
*Alka-Seltzer tablets (43 tablets needed for a class of 16)
*Vinegar
*Cooking oil
*Tap water
Worksheet 3-5
Worksheet 3-6
Slide 3-8
Slide 3-9
*35mm Slide projector

Diagram 3-4

Apparatus for Alka-Seltzer experiments



*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Have available ice water, water at room temperature, and hot water (hot water from the tap is sufficient).

2. Set up a pinwheel and candle apparatus for demonstration purposes.

3. Before class, insert plastic tubing in rubber stoppers, enough for each two-student team. This requires a certain amount of twisting and pushing. If extreme difficulty is encountered, add a drop of mineral oil or glycerine to the hole in the stopper for lubrication. The tubing must extend through the stopper several inches so that the end is within an inch of the bottom of the tube. See Diagram 3-4.

4. This activity may take two to three days to complete. A suggested way of dividing the activity is:

   -Observation of the experiment using Alka-Seltzer in various liquids.

   -Data collecting on the experiment using Alka-Seltzer in various liquids.

   -The experiment using Alka-Seltzer in water at various temperatures.

Begin by selecting a student to light one or more candles to start the pinwheel turning.

While student attention is focused on the burning candle and the turning wheel, say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
aration: vailable ice water, water at room temperature, t water (hot water from the tap is sufficient). a pinwheel and candle apparatus for demon- on purposes. class, insert plastic tubing in rubber rs, enough for each two-student team. This es a certain amount of twisting and pushing. reme difficulty is encountered, add a drop of l oil or glycerine to the hole in the stopper orication. The tubing must extend through the r several inches so that the end is within h of the bottom of the tube. See Diagram 3-4. ctivity may take two to three days to com- A suggested way of dividing the activity is: servation of the experiment using Alka- ltzer in various liquids. ata collecting on the experiment using lka-Seltzer in various liquids. experiment using Alka-Seltzer in ffer at various temperatures. acting a student to light one or more candles pinwheel turning. s attention is focused on the burning candle ing wheel, say:	

MATERIALS

Diagram 3-5

TEACHING STRATEGIES

THIS MACHINE THAT WE BUILT HAS SHOWN US THAT BY BURNING WE CAN RELEASE THE ENERGY STORED IN THE CANDLE. NOW WE ARE GOING TO DO SOME MORE EXPERIMENTS WHERE WE RELEASE STORED ENERGY FROM A CHEMICAL.

Begin this experiment by distributing the materials listed and Worksheet 3-5 to each pair of students.

DISTRIBUTE W

<u>An experiment using Alka-Seltzer in various liquids</u>

Tell the students that they will be testing to see what happens when Alka-Seltzer is dropped into different liquids. Tell the students they will be experimenting twice -- the first time simply to observe what is happening; the second time to observe and record the results.

Direct the students to use the following sequence for each test. Do the cooking oil test last.

1. Make a mark, using masking tape, 6" from the bottom of the test tube to indicate how much liquid is to be used.

2. Fill a large test tube to the tape mark for each testing liquid.

3. 1st test = water
   2nd test = alcohol
   3rd test = vinegar
   4th test = cooking oil

   NOTE: All of these liquids should be at room temperature.

TEACHING STRATEGIES

ACHINE THAT WE BUILT HAS SHOWN US THAT BY
I WE CAN RELEASE THE ENERGY STORED IN THE
. NOW WE ARE GOING TO DO SOME MORE EXPERI-
WHERE WE RELEASE STORED ENERGY FROM A
AL.

experiment by distributing the materials listed
at 3-5 to each pair of students.

DISTRIBUTE MATERIALS

t using Alka-Seltzer in various liquids

dents that they will be testing to see what
Alka-Seltzer is dropped into different
ll the students they will be experimenting
first time simply to observe what is happen-
ond time to observe and record the results.

tudents to use the following sequence for each
e cooking oil test last.

mark, using masking tape, 6" from the
of the test tube to indicate how much
l is to be used.

large test tube to the tape mark for
esting liquid.

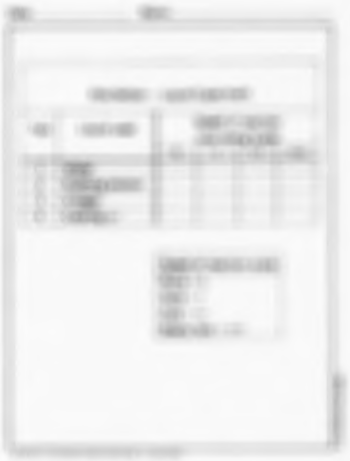
st = water
st = alcohol
st = vinegar
st = cooking oil

All of these liquids should be at room
temperature.

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-4

MATERIALS



Slide 3-8

Worksheet 3-2

TEACHING STRATEGIES

6. Insert the plastic tubing into the test tube but do not completely stopper the tube. Leave the tube open enough to drop in the Alka-Seltzer. See Diagram 3-5. The free end of the plastic tubing should be placed in a beaker or other suitable container to catch any overflow. See Diagram 3-6.

7. Drop in the Alka-Seltzer. (One one-half tablet for each test.)

8. Quickly and tightly stopper the tube and observe what happens.

9. Rinse the tube after each test. Following the cooking oil test, the tubes will have to be washed with detergent solution.

Allow students to perform and observe the four tests. After carefully cleaning the oil from the test tube, have the students repeat each test. Upon repeating the experiment, however, have the students rate the energy released on the worksheet. They do this by indicating the speed of bubbling and how fast the liquid is emptied, using the scale at the bottom of the worksheet. Project slide 3-8 of Worksheet 3-2, pointing out where and how the data are recorded as well as how to use the scale.

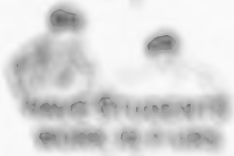
TEACHING STRATEGIES

the plastic tubing into the test tube but do
ntirely stopper the tube. Leave the tube
rough to drop in the Alberteliner. See
3-5. The free end of the plastic tubing
be placed in a beaker or other suitable
ne to catch any overflow. See Diagram 3-6.

the Alberteliner. (See mortalf tablet
n test.)

and tightly stopper the tube and observe
ggress.

ir tube after each test. Following the
oil test, the tubes will have to be washed
ompent solution.



to perform and observe the four tests.
ly cleaning the oil from the test tube, have
repeat each test. Upon repeating the experi-
, have the students take the energy released
ent. They do this by indicating the speed of
ow fast the liquid is emptied, using the
ortion of the stubshaft. Project slide 3-8
3-9, pointing out where and how the data are
ll as how to use the scale.

ANTICIPATED STUDENT BEHAVIORS

Students:

--perform experiments and record observations.

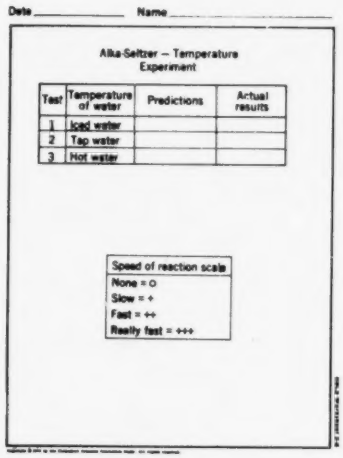
MATERIALS	TEACHING STRATEGIES
	After completion of all tests, again project Slide 3-8. For each liquid, ask for a count of how many students used each rating and put a number under that rating on the transparency. Ask: WHY DIDN'T ALL OF YOU GET THE SAME RATINGS? WHICH OF THE LIQUIDS IN THE TEST TUBES HELPED TO RELEASE THE STORED ENERGY IN THE ALKA-SELTZER? HOW COULD YOU TELL? WHICH LIQUID HELPED RELEASE THE STORED ENERGY THE FASTEST? WHICH LIQUID WAS SECOND FASTEST? Hold up half an Alka-Seltzer tablet and ask: WHERE WAS THE ENERGY BEFORE YOU ADDED THIS CHEMICAL TO THE LIQUIDS? WE'VE SEEN THAT CHEMICAL ENERGY CAN BE STORED IN THE ALKA-SELTZER TABLET. CAN ENERGY BE STORED IN ANYTHING ELSE? If the students do not contribute these or similar examples, discuss with them how unburned material or a battery will do work (release energy) when activated or started.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
etion of all tests, again project Slide 3-8. quid, ask for a count of how many students used and put a number under that rating on the .	
ON'T ALL OF YOU GET THE SAME RATINGS?	--suggest, "The Alka-Seltzer was crumbled," "Weren't watching closely," "Didn't know what the rating meant," "We didn't use exactly 1/2 of a tablet each time."
OF THE LIQUIDS IN THE TEST TUBES HELPED ASE THE STORED ENERGY IN THE ALKA-SELTZER?	--inspect their data and respond that all did.
LD YOU TELL?	--associate the amount of bubbling and emptying of the test tube with energy release.
IQUID HELPED RELEASE THE STORED ENERGY TEST?	--reply, "Vinegar."
IQUID WAS SECOND FASTEST?	--respond, "Water."
an Alka-Seltzer tablet and ask:	
AS THE ENERGY BEFORE YOU ADDED THIS L TO THE LIQUIDS?	--infer the energy was stored in the chemical, Alka-Seltzer.
EEN THAT CHEMICAL ENERGY CAN BE STORED ALKA-SELTZER TABLET. CAN ENERGY BE IN ANYTHING ELSE?	--recall the burning candle or offer other examples such as wood, gas, paper before it burns, a battery before it is used.
the students do not contribute these or ilar examples, discuss with them how urned material or a battery will do k (release energy) when activated or rted.	

ACTIVITY 3-6

52

MATERIALS



Date _____ Name _____

Alka-Seltzer – Temperature Experiment

Test	Temperature of water	Predictions	Actual results
1	Iced water		
2	Tap water		
3	Hot water		

Speed of reaction scale
None = 0
Slow = +
Fast = ++
Really fast = +++

Slide 3-9

Worksheet 3-6

TEACHING STRATEGIES

Now ask:

> WHAT COULD YOU DO TO THE WATER/ALKA-SELTZER TEST TUBE TO MAKE IT GIVE OFF ENERGY AS FAST AS THE VINEGAR/ALKA-SELTZER TEST TUBE?

Allow the students time to test suggestions they make in response to the above question. After allowing time to think, manipulate, experiment, and discuss results, begin the second experiment.

<u>An experiment using Alka-Seltzer in water at various temperatures.</u>

Begin the experiment by handing out Worksheet 3-6.

Say:

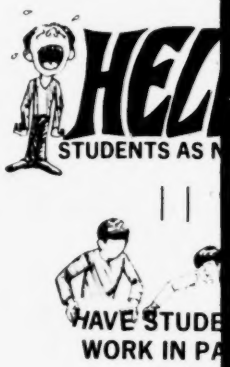
> WE ARE GOING TO DO ANOTHER EXPERIMENT USING ALKA-SELTZER. BUT FIRST LET'S TALK ABOUT WHAT MIGHT HAPPEN. WE ARE GOING TO TRY THREE TESTS.

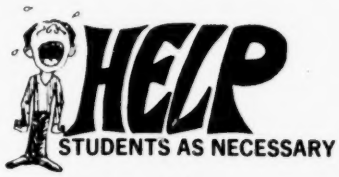
Project Slide 3-9 of Worksheet 3-6.

Read over the worksheet together with the students, discussing what each column is for and what information belongs there. Have water ready as indicated in the teacher preparation instructions.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
LD YOU DO TO THE WATER/ALKA-SELTZER E TO MAKE IT GIVE OFF ENERGY AS FAST INEGAR/ALKA-SELTZER TEST TUBE?	Students: --suggest one of the three methods: 1. add more Alka-Seltzer, 2. add vinegar, or 3. heat the water.
dents time to test suggestions they make in he above question. After allowing time to late, experiment, and discuss results, begin periment.	
WORK TIME	
using Alka-Seltzer in water at various	
eriment by handing out Worksheet 3-6.	
OING TO DO ANOTHER EXPERIMENT USING TZER. BUT FIRST LET'S TALK ABOUT HT HAPPEN. WE ARE GOING TO TRY THREE	
3-9 of Worksheet 3-6.	
worksheet together with the students, dis- each column is for and what information Have water ready as indicated in the ration instructions.	

MATERIALS	TEACHING STRATEGIES
	Ask: WHAT DO YOU THINK WILL HAPPEN IF WE PUT THE ALKA-SELTZER IN THESE LIQUIDS? Refer to Slide 3-9. Remind the students of the rating scale they used in the previous experiment. Then ask: WHICH OF THESE THREE TESTS WILL RELEASE ENERGY THE FASTEST? ON YOUR WORKSHEET MAKE YOUR PREDICTIONS OF HOW FAST THE ENERGY WILL BE RELEASED BY MARKING 0, +, ++, OR +++ BY EACH TEST. Be sure each student has made the three predictions. Now allow students to perform the tests. After the experiment, be sure each student has recorded his own judgment of reaction speed in each test, using the scale provided.



TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
O YOU THINK WILL HAPPEN IF WE PUT THE ELTZER IN THESE LIQUIDS?	--relate heat to energy and make various predictions about the effects of different temperatures of water on Alka-Seltzer.
ide 3-9. Remind the students of the rating used in the previous experiment.	
OF THESE THREE TESTS WILL RELEASE ENERGY STEST?	--make various predictions.
R WORKSHEET MAKE YOUR PREDICTIONS OF HOW HE ENERGY WILL BE RELEASED BY MARKING 0, OR +++ BY EACH TEST.	--rate the predicted results according to the rating scale on Worksheet 3-5.
	
student has made the three predictions. Now ts to perform the tests. After the experiment, student has recorded his own judgment of ed in each test, using the scale provided.	--conduct experiments; each rates the three tests, using the scale provided.

MATERIALS

TEACHING STRATEGIES

WORK TIME

Now project Slide 3-9 again and for each test ask:

WHAT WERE THE RESULTS OF THE EXPERIMENT?

HOW MANY RATED THIS TEST 0? ___ +? ___ ++? ___ +++? ___

Write the agreed upon ratings on the projected image of the worksheet.

If ratings are not readily agreed upon, have the students suggest why differences occurred.

NOTE: It is important to agree upon the relative order of the action of the water temperatures, rather than a specific rating. If everything was performed correctly (i.e., the only variable each time was the temperature), the hotter the water, the more vigorous the reaction.

For each test ask:

DID ANYONE PREDICT WHAT HAPPENED ON THIS TEST?

Recognize and praise all who did.

WHAT THINGS CAUSED A LOT OF MOVEMENT?

WHAT DOES THE BUBBLING SHOW?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
WORK TIME	
Slide 3-9 again and for each test ask:	
RE THE RESULTS OF THE EXPERIMENT?	
Y RATED THIS TEST 0? ___ +? ___ ++? ___	--indicate how they rated each test.
reed upon ratings on the projected image of t.	
re not readily agreed upon, have the students ifferences occurred.	--suggest that it is necessary to compare the four tests; one test caused little or no bubbling and movement of fluid through the tube compared to another that caused a lot.
important to agree upon the relative order of tion of the water temperatures, rather than a ic rating. If everything was performed cor- (i.e., the only variable each time was the ature), the hotter the water, the more us the reaction.	
ask:	
NE PREDICT WHAT HAPPENED ON THIS TEST?	--compare their predicted and actual ratings.
praise all who did.	
NGS CAUSED A LOT OF MOVEMENT?	--respond, "Hot water."
THE BUBBLING SHOW?	--infer, "Energy is being given off."

MATERIALS	TEACHING STRATEGIES
	WHERE WAS THE ENERGY BEFORE THE ALKA-SELTZER WAS PUT INTO THE LIQUIDS? DID YOU GET THE SAME RESULTS IN ALL THE TEST TUBES? WHY NOT? The following instructions will give you a basis for tabulating the responses of your students to this last experiment. Directions for interpreting Worksheet 3-5 - the Alka-Seltzer and water temperature experiment. First, tally each student's prediction and reported results. Then total the number of students who predicted 0, +, ++, +++ for their predicted and actual results. This will give you a picture of the number of students that predicted each rating and what they observed. You will see from looking at this tally whether there is consistency in the class in making predictions or observations. Now look at the three predictions each student made and classify whether his predictions are logical or illogical. If the predictions are in a reverse order (i.e., if a student predicted + for ice water, ++ for tap water, and 0 for hot water), they are illogical. When you have rated each student's paper in terms of logical predictions, you can make a judgment about whether more time should be spent on what to think about when you make predictions, or on explaining why certain predictions are made.

TEACHING STRATEGIES

WAS THE ENERGY BEFORE THE ALKA-SELTZER
UT INTO THE LIQUIDS?

OU GET THE SAME RESULTS IN ALL THE TEST
?

OT?

ing instructions will give you a basis for
the responses of your students to this last

for interpreting Worksheet 3-5 - the Alka-
water temperature experiment.

y each student's prediction and reported
hen total the number of students who predicted
++ for their predicted and actual results.
ive you a picture of the number of students
ted each rating and what they observed. You
om looking at this tally whether there is
in the class in making predictions or obser-

the three predictions each student made and
ether his predictions are logical or illogical.
ictions are in a reverse order (i.e., if a
dicted + for ice water, ++ for tap water, and
ater), they are illogical. When you have
student's paper in terms of logical predictions,
e a judgment about whether more time should be
at to think about when you make predictions,
ining why certain predictions are made.

ANTICIPATED STUDENT BEHAVIORS

Students:

--infer that chemicals such as Alka-Seltzer store energy or have energy in them.

--respond, "No."

--recall that different temperatures release energy at different rates and infer that increased temperature will cause the Alka-Seltzer to release its energy faster.

MATERIALS

TEACHING STRATEGIES

Now look at the three results each student reported for the different water temperatures. These observations are reasonable if they observed an increase in rate of activity across water temperature. For example, a reasonable result would be ice water 0, tap water +, hot water ++, or ice water +, tap water ++, hot water +++. These observed results would be unreasonable if more activity is associated with colder water. You must also watch for the number of responses where there is no change between what a student predicts and what he observes. Students may have been very accurate in predicting, but they may simply be repeating their predictions rather than responding to what they saw. You can use this information to decide whether further discussion is necessary, or if repetition of the activity is needed.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
the three results each student reported for nt water temperatures. These observations are f they observed an increase in rate of acti- water temperature. For example, a reasonable be ice water 0, tap water +, hot water ++, +, tap water ++, hot water +++. These ults would be unreasonable if more activity d with colder water. You must also watch er of responses where there is no change a student predicts and what he observes. have been very accurate in predicting, but ply be repeating their predictions rather than o what they saw. You can use this information ether further discussion is necessary, or if f the activity is needed.	

Teacher _____

Date _____

UNIT III, CORE A

TALLYSHEET 3-3: Tabulation of Student Responses to Worksheet 3-5

ACTIVITY 3-6: "Chemical Energy"

Column 1: First tally each student's prediction. Total the number who predicted 0, +, ++, and +++ to get a picture of the number of students who predicted each rating. Did students consistently predict more activity with higher temperatures?

Column 2: Look at the three predictions each student made and check whether they are logical or illogical. A logical response would show a progression of increasing activity with increasing temperature. The response is illogical if more activity is predicted for a lower temperature than a higher one (e.g., + for ice water, 0 for tap water, and ++ for hot water). If many students have made illogical predictions, time should be spent on what to think about when you make predictions and explanations should be given of why certain predictions are made.

		1 (Prediction)			2	
	KEY:	Ice	Tap	Hot	Logical	Illogical
Attach ID list here.	01	0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
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		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		

	KEY:	Ice	Tap	Hot	Logical	Illogical
Attach ID list here.	01	0 + ++ +++	0 + ++ +++	0 + ++ +++		
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		0 + ++ +++	0 + ++ +++	0 + ++ +++		
TOTALS:		____	____	____	____	____

TALLYSHEET 3-3: Tabulation of Student Responses to Worksheet 3-5

Column 3: Tally each student's reported results. Total the number who reported each rating for each temperature. Did students consistently find more activity associated with higher temperature?

Column 4: Now look at the three results each student reported and check whether they are reasonable or unreasonable. A reasonable set of results will indicate increasing activity with increasing temperature. Results that are unreasonable would report less ice water 0, tap water +, hot water ++, or ice water +, tap water ++, hot water +++. You must also watch for students for whom there is no change between what they predict and what they observe. They may have been very accurate in predicting or they may simply be repeating their predictions rather than responding to what they saw. Use this analysis to plan further activities in predicting and observing as well as an indication of understanding of energy concepts.

		3 (Actual Results)			4	
	KEY:	Ice	Tap	Hot	Reasonable	Unreasonable
Attach ID list here.	01	0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
		0 + ++ +++	0 + ++ +++	0 + ++ +++		
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list here.

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	0 + ++ +++	0 + ++ +++	0 + ++ +++		
	0 + ++ +++	0 + ++ +++	0 + ++ +++		
TOTALS:	____	____	____	_____	_____

UNIT III, CORE A
ACTIVITY 3-6: "Chemical Energy"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____
HARD TO RATE _____ → _____ _____ _____ _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. On the chart below show the number of students making each rating on Worksheet 3-5. (You did this on Slide 3-8 in class.)

Alka-Seltzer - Liquid Experiment

	0	+	++	+++
1. Water				
2. Rubbing Alcohol				
3. Vinegar				
4. Cooking Oil				

18. Complete Tallysheet 3-3 analyzing the results students reported on Worksheet 3-6 and send in with this feedback sheet.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A
ACTIVITY 3-6: "Chemical Energy"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

MATERIALS

Slide 3-10
Slide 3-11
Slide 3-12

(Continued on next page)

TEACHING STRATEGIES

Activity 3-7. How Tall Is J. Oscar Hooperstraat

A graph is one of the more common means of communication among scientists. It is becoming increasingly important as an everyday means of communication, a fact that can be confirmed by picking up any newspaper or magazine. This activity introduces the student to the basic skills of line graph construction and interpretation.

Begin this activity by saying:

SCIENTISTS, WHEN CONDUCTING EXPERIMENTS, MAKE RECORDS OF THINGS THEY SEE HAPPENING. THEY HAVE A SPECIAL WAY OF PRESENTING THIS INFORMATION FOR OTHERS TO READ AND SEE.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-7. HOW TALL IS J. OSCAR HOOPERSTRAAT

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

TEACHING STRATEGIES

-7. How Tall Is J. Oscar Hooperstraat

one of the more common means of communication ntists. It is becoming increasingly important yday means of communication, a fact that can ed by picking up any newspaper or magazine. ity introduces the student to the basic skills aph construction and interpretation.

activity by saying:

TISTS, WHEN CONDUCTING EXPERIMENTS, MAKE OS OF THINGS THEY SEE HAPPENING. THEY A SPECIAL WAY OF PRESENTING THIS INFOR- FOR OTHERS TO READ AND SEE.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have had practice in locating data from the age/height graph and the student absence graph.
--be able to extrapolate to find points not actually plotted on a graph.
--be able to locate the intersection of two lines on a graph and state what that intersection represents.
--have participated in the construction of the rat graph.

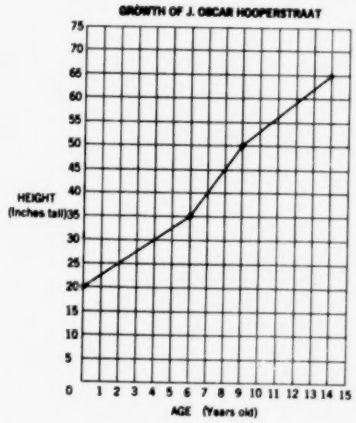
ACTIVITY 3-7

58

MATERIALS

*35mm Slide projector
Worksheet 3-7
Slides 3-13 through 3-16

Slide 3-10



***Not furnished in materials kit**

TEACHING STRATEGIES

Project Slide 3-10 and say:

HERE IS AN EXAMPLE OF WHAT I AM TALKING ABOUT. THIS IS A DIAGRAM SIMILAR TO WHAT SCIENTISTS OFTEN USE. DOES ANYONE KNOW WHAT WE CALL THIS KIND OF DIAGRAM?

> If the term graph is not elicited, say:
>
> THIS DIAGRAM IS CALLED A GRAPH. A GRAPH SHOWS US SOMETHING WITHOUT WRITING IT OUT IN WORDS.

Point to the slide and ask:

CAN ANYBODY FIGURE OUT WHAT THIS GRAPH TELLS US?

NOTE: Because of their backgrounds, some students may be able to read the graph. The majority of the students will probably not be able to comment.

Proceed on the assumption that the majority of the students will need instruction on graph construction and reading a graph.

Refer again to the projected graph, read the title, and ask:

WHAT DOES THE TITLE OF THE GRAPH TELL YOU?

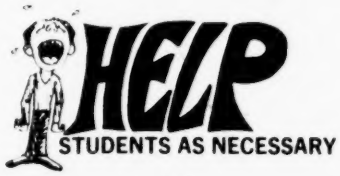
WHAT DO THE NUMBERS ON THE SIDE OF THE GRAPH TELL US?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
3-10 and say:	
AN EXAMPLE OF WHAT I AM TALKING ABOUT. A DIAGRAM SIMILAR TO WHAT SCIENTISTS SE. DOES ANYONE KNOW WHAT WE CALL THIS DIAGRAM?	--respond with such things as, "A picture," "Lines," etc. Few if any students will likely be able to recognize or identify the diagram as a graph.
the term graph is not elicited, say:	
S DIAGRAM IS CALLED A GRAPH. A GRAPH WS US SOMETHING WITHOUT WRITING IT OUT WORDS.	
slide and ask:	
ODY FIGURE OUT WHAT THIS GRAPH TELLS	--respond with "Tells the age," "Tells how tall he is," "Tells us how old," "Tells us something."
e of their backgrounds, some students may e to read the graph. The majority of the ts will probably not be able to comment.	
e assumption that the majority of the students truction on graph construction and reading a	
o the projected graph, read the title, and	
S THE TITLE OF THE GRAPH TELL YOU?	--respond, "He's growing," "How he grows," "It's about J. Oscar Hooperstraat."
THE NUMBERS ON THE SIDE OF THE GRAPH	--study the graph and state, "How old he is."

MATERIALS	TEACHING STRATEGIES
	THE NUMBERS STAND FOR EACH YEAR IN THE LIFE OF J. OSCAR. WHAT DO THE NUMBERS ALONG THE BOTTOM STAND FOR? THE NUMBERS ON THE BOTTOM LINE TELL US HOW MANY INCHES TALL J. OSCAR IS. CAN SOMEONE POINT TO THE PLACE ON THE GRAPH THAT TELLS US WHEN J. OSCAR WAS BORN? If students have difficulty determining this, ask: HOW MANY YEARS OLD IS A PERSON WHO WAS JUST BORN? WHERE IS ZERO YEARS (or no years) ON THE GRAPH? CAN SOMEONE SHOW US HOW TO FIND OUT HOW TALL J. OSCAR WAS WHEN HE WAS BORN? If students do not know how to find a point on the graph, instruct the class on the procedure to do this. Tell them to put one finger on an age and follow that age line across until it intersects the graph line. At that point follow the vertical line down with a finger until it stops at an inches mark.

HEL
STUDENTS AS N

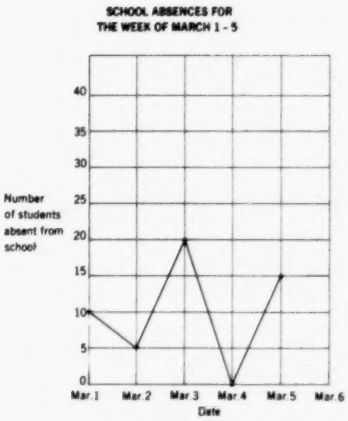
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
NUMBERS STAND FOR EACH YEAR IN THE LIFE J. OSCAR.	
T DO THE NUMBERS ALONG THE BOTTOM STAND ?	--study the graph and state, "How many inches he is," "How tall he is."
NUMBERS ON THE BOTTOM LINE TELL US HOW Y INCHES TALL J. OSCAR IS.	
SOMEONE POINT TO THE PLACE ON THE GRAPH T TELLS US WHEN J. OSCAR WAS BORN?	--locate the "0."
If students have difficulty determining this, ask:	
HOW MANY YEARS OLD IS A PERSON WHO WAS JUST BORN?	--state, "No years," "0 years."
WHERE IS ZERO YEARS (or no years) ON THE GRAPH?	--locate and point to the "0" on the graph.
SOMEONE SHOW US HOW TO FIND OUT HOW TALL OSCAR WAS WHEN HE WAS BORN?	--attempt to put a finger on 0, follow across the axis line until it intersects the graph line, and reply 20 inches.
nts do not know how to find a point on the graph, the class on the procedure to do this. Tell out one finger on an age and follow that age ss until it intersects the graph line. At that low the vertical line down with a finger until it an inches mark.	--practice interpreting the data on the age graph.



ACTIVITY 3-7

60

MATERIALS



Slide 3-11

TEACHING STRATEGIES

Ask:

> CAN ANYONE TELL US, BY LOOKING AT THE GRAPH, HOW TALL J. OSCAR WAS AT SIX YEARS?

Repeat question above for nine years and fourteen years. Be sure that the same students are not always answering the questions. Try to include as many students as possible in the discussion and questioning procedure since this is an instructive exercise and each student will need this information in later activities. Asking questions such as, "JOE, DO YOU THINK HE'S RIGHT?" or "WHAT DO YOU THINK THE ANSWER IS?", "DO YOU AGREE WITH THAT ANSWER?", sometimes helps to include students.

Continue by saying:

> THE PERSON WHO MADE THIS GRAPH DID NOT HAVE THE INFORMATION FOR HOW TALL J. OSCAR WAS AT EIGHT YEARS OF AGE. BY LOOKING AT THE GRAPH, CAN ANYBODY FIGURE OUT HOW TALL HE PROBABLY WAS AT EIGHT YEARS?

Project Slide 3-11.

Say:

> HERE IS ANOTHER GRAPH. LET'S SEE IF WE CAN UNDERSTAND WHAT THE GRAPH IS ABOUT.

To assist students in their interpretations, ask the following questions:

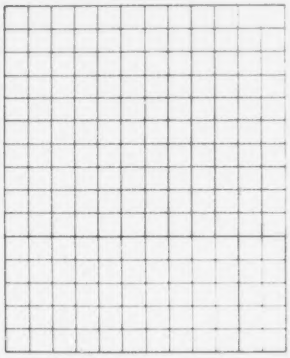
> WHAT DOES THE TITLE TELL US?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ONE TELL US, BY LOOKING AT THE GRAPH, LL J. OSCAR WAS AT SIX YEARS?	--come to graph, interpret graph, and reply thirty-five inches.
ion above for nine years and fourteen years. the same students are not always answering ns. Try to include as many students as possible ussion and questioning procedure since this is ve exercise and each student will need this in later activities. Asking questions such YOU THINK HE'S RIGHT?" or "WHAT DO YOU THINK S?", "DO YOU AGREE WITH THAT ANSWER?", some- to include students.	
saying:	
SON WHO MADE THIS GRAPH DID NOT HAVE THE TION FOR HOW TALL J. OSCAR WAS AT EIGHT F AGE. BY LOOKING AT THE GRAPH, CAN FIGURE OUT HOW TALL HE PROBABLY WAS AT EARS?	- utilize the information on how to use graph, extrapolate, and reply, "Forty-five inches."
e 3-11.	
ANOTHER GRAPH. LET'S SEE IF we CAN AND WHAT THE GRAPH IS ABOUT.	
udents in their interpretations, ask the estions:	
ES THE TITLE TELL US?	--read the title (or listen while it is read to them) and respond, "How many kids are gone," "How many kids are sick."

MATERIALS

Year	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
Rats	75	25	25	50	150	75	50	125	150	100

RATS IN ONE CITY BLOCK OF N.Y. CITY



Slide 3-12

TEACHING STRATEGIES

WHAT DO THE NUMBERS ON THE SIDE OF THE GRAPH TELL US?

WHAT DO THE NUMBERS ON THE BOTTOM OF THE GRAPH TELL US?

ON MARCH 1 HOW MANY STUDENTS WERE ABSENT?

ON MARCH 4 HOW MANY STUDENTS WERE ABSENT?

GIVE STUD TIME TO THINK

ON MARCH 5 HOW MANY STUDENTS WERE ABSENT?

THE PERSON WHO MADE THE GRAPH HAD INFORMATION FOR ONLY ONE WEEK. BUT THE NEXT MONDAY, MARCH 8, HE FOUND OUT THAT FIVE STUDENTS WERE ABSENT. IF WE WANTED TO PUT THAT INFORMATION ON THE GRAPH WHERE WOULD WE PUT THE DOT?

Project Slide 3-12.

Say:

HERE IS A BLANK GRAPH AND ABOVE IT IS SOME INFORMATION. LET'S SEE IF WE CAN PUT THIS INFORMATION ON A GRAPH SO IT WOULD BE EASIER TO READ.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
) THE NUMBERS ON THE SIDE OF THE GRAPH S?	--read side of graph and respond, "Number of students absent."
) THE NUMBERS ON THE BOTTOM OF THE GRAPH S?	--read bottom of graph and respond, "Days in March."
CH 1 HOW MANY STUDENTS WERE ABSENT?	--find the intersection of the number and date lines and reply, "Ten."
CH 4 HOW MANY STUDENTS WERE ABSENT?	--reply, "Zero," "None."
	GIVE STUDENTS TIME TO THINK
CH 5 HOW MANY STUDENTS WERE ABSENT?	--reply, "Fifteen."
SON WHO MADE THE GRAPH HAD INFORMATION Y ONE WEEK. BUT THE NEXT MONDAY, MARCH OUND OUT THAT FIVE STUDENTS WERE ABSENT. ANTED TO PUT THAT INFORMATION ON THE HERE WOULD WE PUT THE DOT?	--respond by pointing to (5, 8) place on graph and connect the line.
e 3-12.	
A BLANK GRAPH AND ABOVE IT IS SOME TION. LET'S SEE IF WE CAN PUT THIS TION ON A GRAPH SO IT WOULD BE EASIER .	

ACTIVITY 3-7

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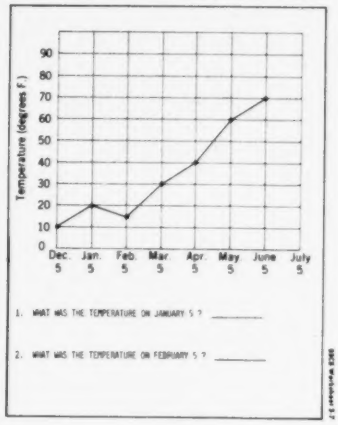
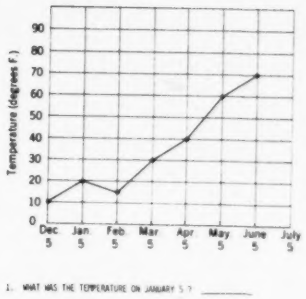
MATERIALS

Worksheet 3-7

Date _____ Name _____



Slide 3-13



TEACHING STRATEGIES

Read data with students so each student understands <u>what</u> is to be graphed, always allowing the <u>students</u> to do the labeling and plotting, and again make sure to include all students in this strategy. Follow the instructions below for constructing the rat graph:

1. Since graphing conventions suggest the time variable be along the bottom axis, direct students to label this axis with the years. This can best be accomplished by telling the students where the dates should be placed and then having one or more volunteers go to the board and label the graph.

2. Repeat this procedure for labeling the vertical, or side, axis with number of rats.

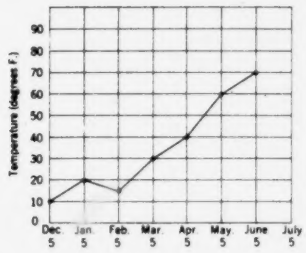
3. Asking different students each time to do the plotting on the board, assist students in plotting points representing the rat data.

4. Direct a student to connect the dots, making a line.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
th students so each student understands what phed, always allowing the students to do the plotting, and again make sure to include all this strategy. Follow the instructions below ting the rat graph:	Students:
graphing conventions suggest the time variable ng the bottom axis, direct students to label xis with the years. This can best be accom- d by telling the students where the dates be placed and then having one or more volun- go to the board and label the graph.	--starting with the first vertical, should label the bottom axis of graph on the chalkboard, using 1945 as the first number, with each line thereafter representing the next consecutive year.
this procedure for labeling the vertical, e, axis with number of rats.	--label the vertical, or side, axis of the graph on the board to look something like this: No. of rats in one city block 200 175 150 125 100 75 50 25 0
different students each time to do the ng on the board, assist students in plotting representing the rat data.	--plot points on graph by placing a dot on the right place on the map.
a student to connect the dots, making a line.	--connect dots.

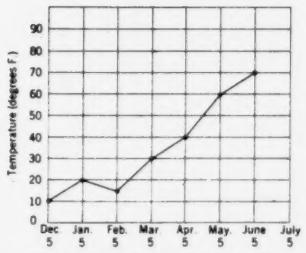
MATERIALS

Slide 3-14



2. WHAT WAS THE TEMPERATURE ON FEBRUARY 5 ? _____

Slide 3-15

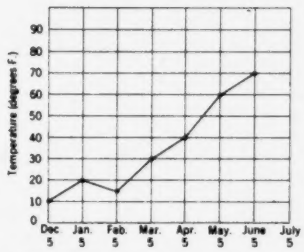


3. COMPARE THE TEMPERATURES FROM JANUARY 5 TO JUNE 5. WHICH SENTENCE BELOW BEST TELLS WHAT HAPPENED TO THE TEMPERATURE?

IT WENT UP.	IT WENT DOWN.	IT STAYED THE SAME.

MARK AN X ON YOUR CHOICE.

Slide 3-16



4. THE TEMPERATURE ON JULY 5 WAS 90°. PLACE A DOT ON THE GRAPH TO SHOW THAT TEMPERATURE.

TEACHING STRATEGIES

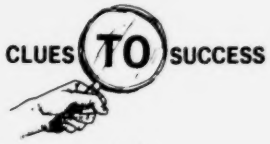
Distribute Worksheet 3-7. Project each of the four questions, Slides 3-13 through 3-16, separately. In each case read the question aloud and pause long enough for the students to study and then mark their answer choices.

Collect the worksheets and then project each slide once again. Give a variety of students the opportunity to go to the chalkboard and point out and explain the reasoning behind their answers for each of the questions. After class tally the student's responses on Tallysheet 3-4, which you will find on the following page.

Conclude by saying:

> WE HAVE SEEN HOW SCIENTISTS GRAPH INFORMATION, WE HAVE LEARNED HOW TO READ THE INFORMATION GIVEN ON A GRAPH, AND FINALLY WE HAVE MADE OUR OWN GRAPHS.
>
> IN THE NEXT ACTIVITY YOU WILL AGAIN BE GRAPHING SOME INFORMATION YOU WILL COLLECT WHILE DOING AN EXPERIMENT.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS



Worksheet 3-7. Project each of the four ques-
des 3-13 through 3-16, separately. In each case
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y the student's responses on Tallysheet 3-4,
will find on the following page.

y saying:

VE SEEN HOW SCIENTISTS GRAPH INFORMATION,
VE LEARNED HOW TO READ THE INFORMATION
ON A GRAPH, AND FINALLY WE HAVE MADE OUR
RAPHS.

E NEXT ACTIVITY YOU WILL AGAIN BE GRAPHING
INFORMATION YOU WILL COLLECT WHILE DOING AN
IMENT.

Teacher _____

Date _____

UNIT III, CORE A
TALLYSHEET 3-4: Tally of Worksheet 3-7 and 3-8
ACTIVITY 3-7: "How Tall Is J. Oscar Hooperstaat"
ACTIVITY 3-8: "The High Flyer"

Tally each student's responses to the four questions in the columns below.

Column 1. Question 1. 20° is the correct answer for January 5. Check the 20° column or write in any other temperature given. Most students should be successful on this question if they have understood this activity. Review or provide further practice as indicated.

Column 2. Question 2. The correct answer, 15° on February 5, requires the student to interpolate as only 10° and 20° are shown. Some students may have difficulty answering this item. Use it for instruction, but do not expect mastery by all students.

Column 3. Question 3. The correct answer is "It went up," the third choice. Check the column showing each student's response. This item will help you learn how many of your students can see a pattern in graphed data, which is the subject of instruction in the next activity.

Column 4. Question 4. Check the appropriate column to show a correct entry of 90° on July 5 or an X on the wrong date or temperature. Mark both if neither is correct. As each student is expected to construct a graph in the next activity, further practice should be provided if students answer this item incorrectly. Retain this tallysheet until Activity 3-8 is completed and students' ability to construct a graph is recorded in column 5.

Column 5. Worksheet 3-9, Activity 3-8. See back of this tallysheet.

		1 (Jan. 5)		2 (Feb. 5)		3 (Jan. 5 to June 5)				4 (July 5)		
	KEY:	20°	Other	15°	Other	Same	Down	Up	Different	OK	Wrong Date	Wrong Temperature
Attach ID list here.	01											

in the next activity.

Column 4. Question 4. Check the appropriate column to show a correct entry of 90° on July 5 or an X on the wrong date or temperature. Mark both if neither is correct. As each student is expected to construct a graph in the next activity, further practice should be provided if students answer this item incorrectly. Retain this tallysheet until Activity 3-8 is completed and students' ability to construct a graph is recorded in column 5.

Column 5. Worksheet 3-9, Activity 3-8. See back of this tallysheet.

		1 (Jan. 5)		2 (Feb. 5)		3 (Jan. 5 to June 5)				4 (July 5)		
	KEY:	20°	Other	15°	Other	Same	Down	Up	Different	OK	Wrong Date	Wrong Temperature
Attach ID list here.	01											

TALLYSHEET 3-4: Tally of Worksheet 3-7 and 3-8

Column 5. Worksheet 3-9, Activity 3-8. Make a check in the yes column if the student was able to accurately graph his high flyer data on Worksheet 3-9. Check no if the student was unsuccessful. Review this tallysheet to decide whether further practice is needed before continuing to Core I.

		5 (High Flyer)		
Attach ID list here.	01	Yes	No	

Does this review give an accurate indication of student's ability to read and construct graphs? ☐ Yes ☐ No

If not, what other evidence do you have of student learning?

UNIT III, CORE A

ACTIVITY 3-7: "How Tall Is J. Oscar Hooperstraat"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did any student give away the answer to any question on Worksheet 3-7?
☐ No ☐ Yes: Comment.

18. Complete Columns 1-4 of Tallysheet 3-4 but retain this tallysheet until data from Worksheet 3-8 is recorded in Column 5 when Activity 3-8 is completed.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A

ACTIVITY 3-7: "How Tall Is J. Oscar Hooperstraat"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

4. Conclude that energy can be stored and later released.

5. Recognize different forms of energy (heat, light, chemical, and electrical).

MATERIALS

TEACHING STRATEGIES

Activity 3-8. The High Flyer

Preceding activities have illustrated that energy is necessary to make something move or change. This activity demonstrates not only that the work released from a system is proportional to the amount of energy put into it, but that the work will not be released unless energy is put in. The student, through constructing a simple line graph, should begin to see that the direction of the line shows a relationship between variables.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

BSCS

ACTIVITY 3-8. THE HIGH FLYER

FOCUS FOR THIS ACTIVITY

GOALS:

. Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

. Conclude that energy can be stored and later released.

. Recognize different forms of energy (heat, light, chemical, and electrical).

TEACHING STRATEGIES

8. The High Flyer

ctivities have illustrated that energy is o make something move or change. This acti- trates not only that the work released from proportional to the amount of energy put t that the work will not be released unless ut in. The student, through constructing a graph, should begin to see that the direc- line shows a relationship between variables.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have played each position in the High Flyer Game.
--have recorded the correct data on Worksheet 3-8.
--have constructed a graph of High Flyer data on Worksheet 3-9.
--be able to make simple interpretations of graphed data.
--be able to state that until someone pulls the rubber band (puts energy in, or "starts" the energy) no energy will come out.
--be able to state that the more the rubber band is stretched (the more energy that is put in), the farther the cap goes (the more movement that results).
--observe that because of variations in game procedures, all graphs will not be exactly the same.

ACTIVITY 3-8

66

MATERIALS

*1 Ruler (12") per group
*2 Nails per group, 1" - 1 1/2" long
*1 Rubber band per group, 3 1/2"-4" unstretched length
*3 Pieces of cardboard or 1 piece of plywood per group at least 12" wide and 12" long (1 foot square)
*1 Flyer cap for each team (*See Planning Guide*)
*Hammer (if wood fling boards are used)
Slide 3-17
Worksheet 3-8
Slide 3-18
Worksheet 3-9
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. This activity may require a distance greater than the length of the average classroom. If, after trying the activity and finding that the classroom is not long enough, make arrangements to do the activity in the hallway, gymnasium, or outdoors.

2. Three team members are required: a flyer, a measurer, and a spotter. Have the members of each team assign themselves to one of the three positions. Rotate students to give each member a turn at each position.

3. Some simple measurement (in feet and inches) is entailed in this activity. Depending on student background, it may be necessary to review or introduce some measurement skills.

The positions:

1. Flyer - propels the cap.

2. Measurer - measures with a yardstick the distance that the cap was propelled.

3. Spotter - marks the spot where the propelled cap first touched the ground.

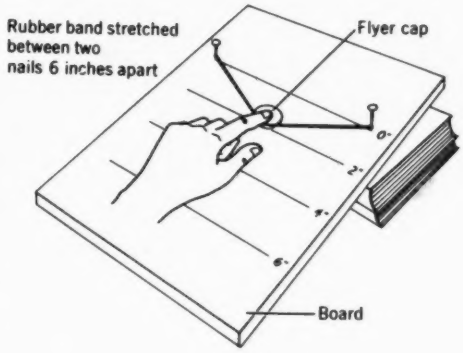
Help the students to assemble the high flyer following the directions below. (See Diagram 3-6)

DISTRIBUTE MA

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
aration: ctivity may require a distance greater than ngth of the average classroom. If, after the activity and finding that the classroom long enough, make arrangements to do the ty in the hallway, gymnasium, or outdoors. team members are required: a flyer, a measurer, spotter. Have the members of each team assign lves to one of the three positions. Rotate ts to give each member a turn at each position. imple measurement (in feet and inches) is ed in this activity. Depending on student ound, it may be necessary to review or intro- ome measurement skills. s: propels the cap. - measures with a yardstick the distance cap was propelled. - marks the spot where the propelled cap first the ground. dents to assemble the high flyer following ns below. (See Diagram 3-6) DISTRIBUTE MATERIALS	

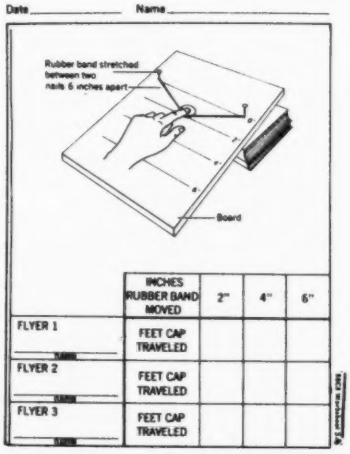
MATERIALS

Diagram 3-6



Slide 3-17

Worksheet 3-8



Date _____ Name _____

Rubber band stretched between two nails 6 inches apart

Board

	INCHES RUBBER BAND MOVED	2"	4"	6"
FLYER 1 _____ NAME	FEET CAP TRAVELED			
FLYER 2 _____ NAME	FEET CAP TRAVELED			
FLYER 3 _____ NAME	FEET CAP TRAVELED			

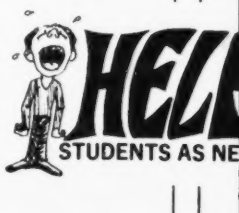
TEACHING STRATEGIES

1. Distribute Worksheet 3-8 to each team and the materials necessary to construct the high flyer.
2. Draw a 6" line one inch in from one edge of the board.
3. Pound in a nail at each end of the 6" line. (If cardboard is used instead of wood, tape at least three thicknesses together to obtain the necessary rigidity and use a stapler to staple each end of the rubber band to the cardboard.)
4. Stretch the rubber band between the two nails.
5. With a ruler place marks at 2", 4", 6" back from the original 6" line. Have students mark 2", 4", 6" on the board.

Project Slide 3-17.

Give the following instructions to the students for the use of the high flyer. Using a board, demonstrate how it operates.

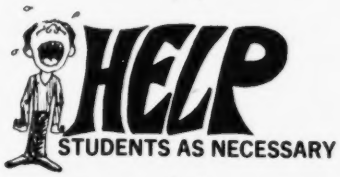
CONSTRUCTION



DEMONSTRAT

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ute Worksheet 3-8 to each team and the materials ry to construct the high flyer.	
6" line one inch in from one edge of the board.	
n a nail at each end of the 6" line. (If rd is used instead of wood, tape at least three sses together to obtain the necessary rigidity a stapler to staple each end of the rubber the cardboard.)	
the rubber band between the two nails.	
ruler place marks at 2", 4", 6" back from the l 6" line. Have students mark 2", 4", 6" on rd.	--construct high flyer board.

CONSTRUCTION TIME



de 3-17.

llowing instructions to the students for the high flyer. Using a board, demonstrate how it

ACTIVITY 3-8

MATERIALS

TEACHING STRATEGIES

1. Angle the board by placing books or some other object under the front of the board so the front of the board is approximately 4" off the surface the board is resting on. (See Diagram 3-6)

2. The "Flyer" places a cap in front of both strands of the rubber band.

3. Pull the cap back until the back edge of the cap is even with the 2" mark. Hold the cap in position by pressing the cap against the board with a finger. (See Diagram 3-6)

4. Let'er fly by lifting the finger.

5. The spotter should mark immediately where the cap strikes the floor or ground for the first time. (Do not count misfires. Do not count any rolling or sliding which follows the touchdown of the cap.)

6. The measurer determines the distance the cap has travelled to the nearest foot by using a yardstick, making sure all measuring begins at the front edge of the board.

7. The flyer records on his worksheet the distance, as determined by the measurer. Each student, when it comes his turn to be the flyer, will use that data and record it on his worksheet.

8. Procedures 2-6 are repeated for two more projections, changing the stretch of the rubber band to 4" and 6".

9. After a student has recorded three (2", 4", and 6") flings on his worksheet, the team rotates positions until each member has had a turn at each position.

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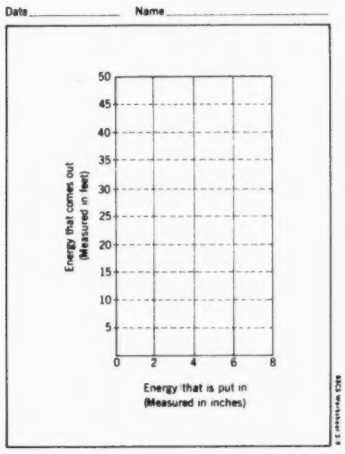
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
board by placing books or some other object front of the board so the front of the board imately 4" off the surface the board is n. (See Diagram 3-6) r" places a cap in front of both strands of r band. cap back until the back edge of the cap is the 2" mark. Hold the cap in position by the cap against the board with a finger. ram 3-6) y by lifting the finger. er should mark immediately where the cap e floor or ground for the first time. (Do misfires. Do not count any rolling or hich follows the touchdown of the cap.) er determines the distance the cap has to the nearest foot by using a yardstick, e all measuring begins at the front edge ard. records on his worksheet the distance, as d by the measurer. Each student, when it turn to be the flyer, will use that data d it on his worksheet. s 2-6 are repeated for two more projections, the stretch of the rubber band to 4" and 6". udent has recorded three (2", 4", and 6") his worksheet, the team rotates positions member has had a turn at each position.	Students: --follow the instructions given and perform the experiment. --should rotate positions until each member has had a turn in each position.

MATERIALS

Slide 3-18

Worksheet 3-9



TEACHING STRATEGIES

FLING TI

Now again focus the students' attention to Slide 3-17 and to their own individual Worksheets 3-8.

WHERE DID THE ENERGY COME FROM TO FLING THE CAP?

HOW DID WE CHANGE THE AMOUNT OF ENERGY THAT WE PUT INTO THE CAP?

Distribute Worksheet 3-9 (graph) to each student. Project the Slide 3-18 and discuss the label given each axis.

Ask:

(Student's name), HOW MANY FEET DID YOUR CAP GO WHEN YOU PULLED IT BACK TWO INCHES?

WHERE WOULD WE PLOT THIS ON OUR GRAPH?

Continue with these same two questions, using different students for 4" and 6" so you will have three points plotted. Then select another student to connect the dots.

Now direct students to complete a graph of their own data by plotting the points and then connecting them.

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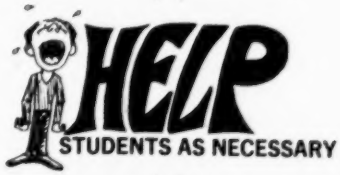
STUDENTS AS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
FLING TIME	
cus the students' attention to Slide 3-17 and individual Worksheets 3-8.	
ID THE ENERGY COME FROM TO FLING THE	--correctly respond, "From the elastic stretch," "My arm," "The pull," "From me."
WE CHANGE THE AMOUNT OF ENERGY THAT WE O THE CAP?	--associate the relation of stretch to energy input.
orksheet 3-9 (graph) to each student. Project 18 and discuss the label given each axis.	
t's name), HOW MANY FEET DID YOUR CAP YOU PULLED IT BACK TWO INCHES?	--reply with the number of feet recorded on his worksheet.
OULD WE PLOT THIS ON OUR GRAPH?	--come to projector and make a dot on the appropriate point.
n these same two questions, using different 4" and 6" so you will have three points en select another student to connect the dots.	
tudents to complete a graph of their own data the points and then connecting them.	--recall graphing done in the previous activity and construct a graph of their data.



MATERIALS

TEACHING STRATEGIES

Continue by saying:

THIS SIDE OF THE GRAPH (point to graph on slide) SHOWS US THE ENERGY WE PUT INTO THE FLYER.

THIS SIDE OF THE GRAPH (again point) SHOWS US THE ENERGY THAT COMES OUT OF THE FLYER.

THE LINE ON THE GRAPH TELLS US HOW THE ENERGY WE PUT IN AND THE ENERGY COMING OUT GO TOGETHER.

WHAT HAPPENS TO THE LINE AS WE PUT MORE ENERGY IN? (Trace finger along energy input axis.)

WHAT HAPPENS TO THE LINE AS MORE ENERGY COMES OUT? (Trace finger along energy output axis.)

THEN WHAT DOES THE GRAPH SHOW US ABOUT THE AMOUNT OF ENERGY PUT IN COMPARED TO THE AMOUNT OF ENERGY COMING OUT?

All graphs may not be the same. This is to be expected, although the lines should be sloping upward as in the diagram. To introduce the reasons for variability of data, you might ask:

WHY AREN'T ALL THE GRAPHS EXACTLY THE SAME?

SO EVEN THOUGH ALL THE GRAPHS ARE NOT EXACTLY THE SAME, AGAIN WHAT DOES THE LINE ON THE GRAPH SHOW US ABOUT THE AMOUNT OF ENERGY PUT IN COMPARED TO THE AMOUNT OF WORK DONE?

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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
saying:	
IDE OF THE GRAPH (point to graph on SHOWS US THE ENERGY WE PUT INTO YER.	
IDE OF THE GRAPH (again point) SHOWS US ERGY THAT COMES OUT OF THE FLYER.	
NE ON THE GRAPH TELLS US HOW THE ENERGY IN AND THE ENERGY COMING OUT GO TOGETHER.	
APPENS TO THE LINE AS WE PUT MORE ENERGY Trace finger along energy input axis.)	--reply, "The line goes up," "It gets higher."
APPENS TO THE LINE AS MORE ENERGY COMES (Trace finger along energy output axis.)	--reply, "The line goes up," "It gets higher."
HAT DOES THE GRAPH SHOW US ABOUT THE OF ENERGY PUT IN COMPARED TO THE OF ENERGY COMING OUT?	--infer that the energy output is directly related to the energy input.
may not be the same. This is to be expected, e lines should be sloping upward as in the o introduce the reasons for variability of data, sk:	
EN'T ALL THE GRAPHS EXACTLY THE SAME?	--infer that not all students will pull their cap to the same point before releasing, not all rubber bands are exactly the same, not everybody measures the same, the slope of the boards may differ, etc.
N THOUGH ALL THE GRAPHS ARE NOT EXACTLY ME, AGAIN WHAT DOES THE LINE ON THE GRAPH S ABOUT THE AMOUNT OF ENERGY PUT IN COM- TO THE AMOUNT OF WORK DONE?	--conclude that the work output is directly related to the energy input.

UNIT III, CORE A
ACTIVITY 3-8: "The High Flyer"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Rate each student's ability to graph his data on Worksheet 3-9 and tally the results in Column 5 of Tallysheet 3-4 which was also used in Activity 3-7.

18. Send in student worksheets 3-8 and 3-9 with the tallysheet and this feedback form.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A
ACTIVITY 3-8: "The High Flyer"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

UNIT III
REACTIONS TO CORE A

1. Was the background information for this core adequate? ☐ Yes ☐ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name First

W = white
B = black
S = Spanish-American
O = other

W = WISC
B = Binet
O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

roup	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

e
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W = WISC
B = Binet
O = other
(name)

SIDE B

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMEN

CORE B. ENERGY IN FOOD

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

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2. Appreciate and understand man's

OBJEC

1. Recognize that food is our main s
2. Appreciate that being alive is a
3. Determine that different foods ha
4. Determine that increased activity
5. Realize that maintaining one's he nutritional needs in addition to

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

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UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE B

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMEN

CORE B. ENERGY IN FOOD

CORE B RATIONALE

People, like other animals, require a continual input of food (energy and raw materials) to maintain themselves and their activities. Living organisms may be viewed as energy-possessing systems which obtain energy from their environment. Supporting the metabolism of an average person requires the input of a minimum number of calories per day. It is the purpose of Core B to establish in the mind of the student that energy is indeed required to live, that food is a person's source of energy, and that variations in the makeup of foods necessitate a balanced diet in terms of energy and health. This is the general picture we wish to examine after the basic ideas of what energy is have been established.

In the first activity of this Core (Food "Go Power") a brief review of some of the basic concepts of energy, as established in Core A, is followed by the rapid burning and explosion of finely powdered plant material. This demonstrates quite vividly to the student that food material does indeed contain energy. The actual burning of familiar food, causing their pinwheels to turn, shows the students that food definitely contains energy that can "do something."

Since all the examples of energy so far have involved obvious movement, it is likely that a number of students will have the impression that energy is being used only when visible movement can be observed. Activity 3-10 (It Takes Energy To Live) is designed to help the student realize that simply being alive, involving activities not visible to the eye, requires energy. Measuring the heat output resulting from more vigorous activity will illustrate that increased activity requires more energy. The activity also provides an opportunity for the student to practice graphing skills by constructing a line graph of temperature over time recorded by the student.

Activity 3-11 (Measuring With A Balance) is an activity only indirectly related to food and energy. In order to develop the concept

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UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

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BACKGROUND INFORMATION FOR THE TEACHER

The energy content of any food is measured in terms of calories, the amount of energy released when a specific amount of dry foodstuff is burned completely. The figures obtained from this burning are the combustion values of foodstuffs. The activities in this core develop around this concept.

In Activity 3-9 (Food "Go Power"), "Powdered Food" (lycopodium spores) is ignited and blows the top off a can. Lycopodium is a plant commonly referred to as "club moss." While the spores of this plant are not normally used as food, they do resemble yellow flour. If the students question whether the "yellow flour" is really food or not, state that it could be, although it is not normally used as food, and that the reason it is used in the activity is that it demonstrates the "go power" best. The material is used in this activity because of its extreme flammability. When the powder is sprayed and suspended in the air, the tiny particles ignite all at once because of the large surface area per volume exposed to the air. The rapid burning and resulting increase in temperature cause the air inside the can to expand and blow the lid off.

Obviously our bodies do not explode when our food is "burned." Enzyme-controlled reactions cause the energy to be released a little at a time and stored temporarily rather than to be released in one sudden reaction.

Energy is constantly being used by our systems to maintain our body temperature at approximately 98.6° F., the temperature at which the bodily reactions take place most efficiently. In Activity 3-10 (It Takes Energy To Live) a hand placed in cold water will raise the temperature of that water, even though the hand does not move. Movement of the hand raises the water temperature proportionately because of increased energy utilization and resultant loss of heat to the water.

CORE B RATIONALE (continued)

that equal amounts of different foods release different amounts of energy when burned, it is essential that the student be able to weigh equal portions to be tested. This activity introduces the student to the equal arm balance and its practical applicability, and provides an opportunity to practice weighing small objects or amounts of materials.

In Activity 3-12 (Measuring Energy Values) the student constructs a simple calorimeter (a device for measuring heat changes) in order to gather quantitative data about the energy contained in different kinds of foods. Using the measuring skills from the previous activity the students weigh equal portions of food, burn them under a test tube of water, and determine the temperature before and after burning. The resulting changes in temperature serve to establish the fact that different foods vary in their energy content. The term "calorie" is introduced and defined as the word used to describe the amount of energy in foods. Through the use of a calorie book the students discover they can look up the energy (calorie) content of most foods. This again reinforces the idea that all foods do not contain the same amount of energy.

It is important that the student not be left with the false impression that the calorie content of foods is the only consideration. Definite substances must be provided from which organisms can grow and repair tissue and maintain overall health. For example, no person remains healthy without proteins in his food. Vitamins and minerals, too, are necessary for growth and health, although needed in only very small amounts. By playing the *Full and Healthy* game in Activity 3-13, the students become aware of their nutritional needs. Each student who is playing the game is required to complete a balanced daily diet by selecting correct portions of food from the basic four food groups. The activity is presented to stress the idea that while eating food

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Activity 3-11 (Measuri
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In Activity 3-12
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BACKGROUND INFORMATION FOR THE TEACHER (continued)

The principal of weighing an object or substance by balancing it with weights should be apparent when carrying out the instructions in Activity 3-11 (Measuring With A Balance). The balance supplied with this program is surprisingly accurate if set up and used according to the instructions in the activity.

In Activity 3-12 (Measuring Energy Values) the students, using the calorimeter, roughly approximate the caloric content of selected foods. The change in heat during the burning of a food tells us a great deal about the total energy change in the reaction. The major device for measuring heat changes when food is burned is a calorimeter. A carefully weighed quantity of some material is burned within the calorimeter, and the heat liberated is measured as a rise in the temperature of a water bath. The calorimeter as constructed and used by the students allows too much heat to escape and is therefore not very accurate. It is, however, adequate for the concept developed in this activity.

The basic unit for the measurement of heat is the calorie. However, when considering the heat of chemical reactions, scientists often use the kilocalorie (Calorie spelled with a capital "C"), rather than the small calories. This large calorie is the amount of heat needed to raise the temperature of 1,000 grams of water one degree centigrade. This is the unit almost always used to express food energy requirements and the calorie content of foods.

The basic four food groups used in Activity 3-13 (A Winner Is "Full And Healthy") are the food groups most commonly accepted by dieticians and health experts.

CORE B RATIONALE (continued)

for energy is important and necessary, it is not the only criterion which should be used in selecting foods to eat.

Throughout Core B, in the examination of food energy, the emphasis is on student involvement and participation, constructing and manipulating science apparatus, data gathering, and game playing. Activity 3-14 (Popeye's Quick Energy -- Review Of Success), the final activity in Core B, uses a short story to stimulate discussion. The student completes a worksheet designed to find out how well he understands the concept of energy and its relationship to food.

he only criterion

energy, the
on, constructing
, and game playing.
Success), the final
e discussion. The
how well he under-
to food.

Me and my Environment

UNIT III
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the m*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies neede

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics and*
3-9. Food "Go Power" Page _____ Date planned _____	Candle Matches Clean paint can with lid Pin wheels Aluminum foil Foods that burn	Lycopodium spores Measuring spoons Vinyl tubing Syringe bulb Tweezers	Two inches or les One book Quart size probab *From Activity 3-3* Examples: marshmallows potato chips walnuts peanuts dried fruit Small amount One set Three feet One One per student *NOTE: Practice t class to a*
3-10. It Takes Energy To Live Page _____ Date planned _____	35mm Slide projector Paper towels or sponges Masking tape Large containers Ice Timer or clock with second hand Felt tip pens		Class supply *Three containers enough to place or something si* Five pound bag Class supply

PLANNING GUIDE

ome activities (*indicated in italics and an ☛ in the margin*) must
e prepared several days or weeks in advance. Use this summary as
teaching and preparation schedule. All supplies needed are listed.

BSCS

st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
ish	Materials in Supply Kit	
id		Two inches or less in length One book Quart size probably the best. Other sizes will work. *From Activity 3-3. One per student*
		Examples: marshmallows potato chips walnuts peanuts dried fruit
	Lycopodium spores	Small amount
	Measuring spoons	One set
	Vinyl tubing	Three feet
	Syringe bulb	One
	Tweezers	One per student *NOTE: Practice the demonstration in this activity before class to assure success.* ☛
s		Class supply
		Three containers per group of four students. Must be large enough to place hands in. Suggest: 1/2 gallon milk cartons or something similar. ☛
cond		Five pound bag
		Class supply

Me and my Environment

UNIT III
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in t*
be prepared several days or weeks in advance. Use t
a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
3-10. It Takes Energy To Live (Continued)		Metal backed thermometers Thermometer Worksheet 3-10 Worksheet 3-11 Slide 3-19 Slide 3-20	Three per gr Demonstratio Hand Movemen Graph of Han Worksheet 3- Worksheet 3-
3-11. Measuring With A Balance Page _____ Date planned _____	Pliers or strong scissors Objects to weigh	Equal arm balance kits	One *Objects migh* *paper clip* *pennies* *erasers* *Life Saver* *pencils* *rubber ban* *ping pong* *popcorn* *styrofoam* *marbles, e* Four per clas

PLANNING GUIDE

Some activities (*indicated in italics and an ↖ in the margin*) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

BSCS

List of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
nish	Materials in Supply Kit	
	Metal backed thermometers	Three per group of four students
	Thermometer	Demonstration model
	Worksheet 3-10	Hand Movement Experiment
	Worksheet 3-11	Graph of Hand Movement Experiment
	Slide 3-19	Worksheet 3-10
	Slide 3-20	Worksheet 3-11
ssors		One
		Objects might include:
		paper clips
		pennies
		erasers
		Life Savers
		pencils
		rubber bands
		ping pong balls
		popcorn
		styrofoam balls
		marbles, etc.
	Equal arm balance kits	Four per class

Me and my Environment

UNIT III
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-12. Measuring Energy Values Page ____ Date planned _____	Can openers Large juice can Pencils or sticks Hardware cloth Matches Hot pads Foods that burn String Aluminum foil Pliers 35mm Slide projector	Balances used in Activity 3-11 Test tubes Black rubber washers Metal backed thermometers Beakers Worksheet 3-12 Worksheet 3-13 Slide 3-21 Slide 3-22 Slide 3-23 Calorie books Camera (Polaroid Square Shooter)	*Can punch and* *One per team o* *collected in* *Two per pair o* *One piece (3"* *Many books (fi* *Several per te* *Examples:* *peanuts* *walnuts* *marshmallows* *potato chips* *12" piece per* *One piece per* *One* Large Pyrex tu One per team o One per team o Two 250 ml bea How To Make A Calorimeter Da Worksheet 3-12 Peanuts and su Worksheet 3-13 Eight per clas

PLANNING GUIDE

BSCS

e activities (*indicated in italics and an* ☛ *in the margin*) must prepared several days or weeks in advance. Use this summary as eaching and preparation schedule. All supplies needed are listed.

t of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
		Can punch and standard opener. Several if possible.
		One per team of two students. Large juice cans should be collected in advance. ☛
		Two per pair of students
		One piece (3" square) per team of two students ☛
		Many books (fireplace type preferable)
		Several per team of two students
		Examples:
		peanuts
		walnuts ☛
		marshmallows
		potato chips, etc.
		12" piece per team of two students
		One piece per team of two students
		One
	Balances used in Activity 3-11	
	Test tubes	Large Pyrex tubes. One per team of two students
	Black rubber washers	One per team of two students
	Metal backed thermometers	One per team of two students
	Beakers	Two 250 ml beakers per team of two students
	Worksheet 3-12	How To Make A Calorimeter
	Worksheet 3-13	Calorimeter Data Chart
	Slide 3-21	Worksheet 3-12
	Slide 3-22	Peanuts and sugar burning
	Slide 3-23	Worksheet 3-13
	Calorie books	Eight per class
	Camera (Polaroid Square Shooter)	

Me and my Environment

UNIT III
CORE B

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the* be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-13. A Winner Is "Full And Healthy" Page _____ Date planned _____	35mm Slide projector	Game - *Full and Healthy* Wall chart Calorie book Slide 3-24 Slide 3-25 Worksheet 3-14 Slide 3-26 Worksheet 3-15 Slide 3-27	One deck of car "Food Groups" One Chocolate bar Eating a plate Score Sheet for Worksheet 3-14 Score Sheet for Worksheet 3-15
3-14. Popeye's Quick Energy--Review Of Success Page _____ Date planned _____	35mm Slide projector	Worksheet 3-16 Slide 3-28 Slide 3-29	Popeye Worksheet Front of Worksh Back of Workshe

PLANNING GUIDE

e activities (*indicated in italics and an* ☛ *in the margin*) must prepared several days or weeks in advance. Use this summary as eaching and preparation schedule. All supplies needed are listed.

BSCS

t of Supplies Needed		
h	Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Game - *Full and Healthy*	One deck of cards per group of four students
	Wall chart	"Food Groups"
	Calorie book	One
	Slide 3-24	Chocolate bar
	Slide 3-25	Eating a plate of chocolate bars
	Worksheet 3-14	Score Sheet for *Full and Healthy*
	Slide 3-26	Worksheet 3-14
	Worksheet 3-15	Score Sheet for *Full and Healthy* -- with energy
	Slide 3-27	Worksheet 3-15
	Worksheet 3-16	Popeye Worksheet
	Slide 3-28	Front of Worksheet 3-16
	Slide 3-29	Back of Worksheet 3-16

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.

MATERIALS

Explosion can apparatus:

Lycopodium spores
Measuring spoons
*Candle (2" or less)

(Continued on next page)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-9. Food "Go Power"

Having previously inferred that there is energy stored in chemicals, and that energy is anything that moves or changes something, students will now begin to relate this concept to themselves and to the food they eat.

Teacher Preparation:

(Practice this demonstration before class to become accustomed to the loud and impressive reaction as the lid explodes from the top of the can.)

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

ACTIVITY 3-9. FOOD "GO POWER"

BSCS

FOCUS FOR THIS ACTIVITY

GOALS:

. Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

. Recognize that food is our main source of energy.

TEACHING STRATEGIES

9. Food "Go Power"

icusly inferred that there is energy stored s, and that energy is anything that moves or ething, students will now begin to relate t to themselves and to the food they eat.

paration:

his demonstration before class to become to the loud and impressive reaction as the lid om the top of the can.)

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have recalled the definition of energy, and the different kinds of energy.
--have described a way stored energy is released.
--have stated that food gives our bodies energy to move or change.
--have observed the demonstration of exploding "yellow flour."
--have designed and performed an experiment to see if food has stored energy that can be used to move or change something.
--have reported what he learned about food to the class.
--have inferred that there is stored energy in food.
--have identified food as his own body's source of energy.

ACTIVITY 3-9

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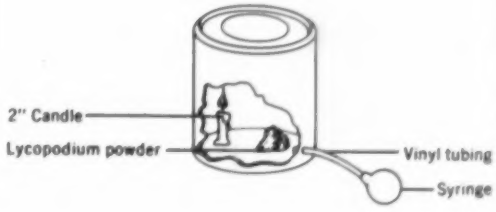
MATERIALS

*Matches
3 Feet vinyl tubing
Syringe bulb
*Clean paint can with lid
*Pinwheels from Activity 3-3 (1 per student)
Tweezers (1 per student)
*Aluminum foil
*Foods (marshmallows, potato chips, walnuts, dried fruit)

Diagram 3-7



*Not furnished in materials kit

TEACHING STRATEGIES

1. Assemble the explosion device in advance according to the directions below. (See Diagram 3-7.)

   a. Cut a hole the size of the diameter of the vinyl tubing in the side of the paint can (near the bottom). This may be done with a can opener, large nail, drill, or tin snips. Bend sharp edges inside or cut them off.

   b. Insert the vinyl tubing through the hole. Make as tight a fit as possible.

   c. Attach the syringe bulb to end of tubing, making sure that there is a fairly tight connection.

   d. Using a drop of wax, fasten a candle to the bottom of the can. A short candle (2" or less) works best.

   e. Place approximately two teaspoons of "yellow flour" inside the can in front of the tubing opening. Rake the flour into a mound.

2. Some suggestions and reminders that you might give individual students as work on the pinwheel-food burning experiment progresses:

   a. Make sure the foods used burn easily. Dried foods with a high oil content are especially useful.

   b. Make sure that the food is burning before being placed under the pinwheel so that the burning match is not associated with making the wheel turn.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
le the explosion device in advance ing to the directions below. (See m 3-7.) t a hole the size of the diameter of the nyl tubing in the side of the paint can ear the bottom). This may be done with a n opener, large nail, drill, or tin snips. nd sharp edges inside or cut them off. sert the vinyl tubing through the hole. ke as tight a fit as possible. tach the syringe bulb to end of tubing, king sure that there is a fairly tight nnection. ing a drop of wax, fasten a candle to the ttom of the can. A short candle (2" or ss) works best. ace approximately two teaspoons of "yellow our" inside the can in front of the tubing ening. Rake the flour into a mound. uggestions and reminders that you might ndividual students as work on the el-food burning experiment progresses: ke sure the foods used burn easily. Dried ods with a high oil content are especially eful. ke sure that the food is burning before ing placed under the pinwheel so that e burning match is not associated with king the wheel turn.	

MATERIALS	TEACHING STRATEGIES
	c. Cover the work area with aluminum foil to avoid burning the table top. d. Food may be held by forceps or a dissecting needle, then lit, and held under the pinwheel. Begin this activity by briefly reviewing concepts in Core A. One suggestion is to divide the class into two teams (boys versus girls, A versus B, one side of the room versus another side), and ask questions in an alternating fashion to each team. See which team answers the most questions correctly. Select a scorekeeper. Ask such questions as: WHAT IS ENERGY? WHAT KIND OF ENERGY MADE THE CRYSTALS MOVE IN ONE OF YOUR FIRST EXPERIMENTS? WHAT KIND OF WATER HELPED THE ALKA-SELTZER TO RELEASE ITS ENERGY THE FASTEST? Some students may confuse the two experiments that utilize Alka-Seltzer and respond "Chemical Energy." If such is the case give them credit, but have them recall that the experiment showed that the hotter the water, the faster the energy in the Alka-Seltzer was released. IS HEAT ENERGY THE ONLY KIND OF ENERGY WE SEE DO SOMETHING? WHAT OTHER KINDS OF ENERGY ARE THERE? DOES A MACHINE OR BODY ALWAYS HAVE TO USE UP ENERGY RIGHT AWAY? IF IT ISN'T USED RIGHT AWAY, WHAT HAPPENS TO IT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
Cover the work area with aluminum foil to avoid burning the table top.	
Food may be held by forceps or a dissecting needle, then lit, and held under the pinwheel.	
s activity by briefly reviewing concepts in Core uggestion is to divide the class into two teams sus girls, A versus B, one side of the room versus ide), and ask questions in an alternating fashion eam. See which team answers the most questions . Select a scorekeeper. Ask such questions as:	
IS ENERGY?	--recall past experiences in Core A and respond, "Anything that moves or changes something."
KIND OF ENERGY MADE THE CRYSTALS MOVE IN ONE OUR FIRST EXPERIMENTS?	--respond, "Heat energy."
KIND OF WATER HELPED THE ALKA-SELTZER TO ASE ITS ENERGY THE FASTEST?	--respond, "Hot water."
ents may confuse the two experiments that utilize zer and respond "Chemical Energy." If such is give them credit, but have them recall that the t showed that the hotter the water, the faster the the Alka-Seltzer was released.	
EAT ENERGY THE ONLY KIND OF ENERGY WE SEE OMETHING?	--respond, "No."
OTHER KINDS OF ENERGY ARE THERE?	--respond "Sun," "Electrical," "Chemical," "Muscle."
A MACHINE OR BODY ALWAYS HAVE TO USE UP GY RIGHT AWAY?	--reply, "No."
ISN'T USED RIGHT AWAY, WHAT HAPPENS TO IT?	--reply, "It can be kept," "It can be stored."

MATERIALS	TEACHING STRATEGIES
	More questions of this type may be asked by the teacher, but those listed above should be sufficient to recall information from Core A. Tally the points won by each team and declare the winner. (Perhaps the winning team could eat the leftover food from Part II of this activity.) The teacher should copy and tally the responses given to each question if possible to check concept attainment. If responses are few or incorrect, further discussion of concepts covered in Core A should be pursued before proceeding. When the class is again assembled in one group ask: CAN OUR BODIES MOVE AND DO THINGS? WHAT ARE SOME EXAMPLES OF WHAT THEY CAN DO? WHAT DOES OUR BODY NEED IN ORDER TO DO THINGS? If the word "food" is not specifically mentioned, ask: WHAT DO WE CALL THE STUFF OUR BODIES USE TO GIVE US ENERGY? Make sure students say "food" before asking: DO FOODS STORE ENERGY? Then say: TO FIND OUT, LET'S TRY AN ACTIVITY WITH "YELLOW FLOUR" TO SEE IF IT CAN GIVE OFF ENERGY. Show students the explosion can apparatus that you assembled in advance. Walk around the room so each student can see the inside of the apparatus. Explain to the students how it was assembled and what it consists of.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
s of this type may be asked by the teacher, ted above should be sufficient to recall rom Core A. Tally the points won by each are the winner. (Perhaps the winning team leftover food from Part II of this activity.) hould copy and tally the responses given to if possible to check concept attainment. are few or incorrect, further discussion of red in Core A should be pursued before	
s is again assembled in one group ask:	
BODIES MOVE AND DO THINGS?	--respond, "Yes."
SOME EXAMPLES OF WHAT THEY CAN DO?	--respond, "Throw a ball," "Run," "Lift a book," "Heart pumps," "Breathe," etc.
S OUR BODY NEED IN ORDER TO DO THINGS?	--respond, "Energy," "Food."
the word "food" is not specifically tioned, ask:	
T DO WE CALL THE STUFF OUR BODIES USE GIVE US ENERGY?	--respond, "Food."
dents say "food" before asking:	
STORE ENERGY?	--respond, "Yes," "I don't know," "Perhaps."
OUT, LET'S TRY AN ACTIVITY WITH "YELLOW O SEE IF IT CAN GIVE OFF ENERGY.	
the explosion can apparatus that you advance. Walk around the room so each e the inside of the apparatus. Explain s how it was assembled and what it consists	--carefully inspect the apparatus and note the components of its operation.

MATERIALS	TEACHING STRATEGIES
	Be sure they see the "yellow flour" added, or have a student add the "yellow flour." Have them stand well away from the can. Light the candle and place the paint lid on <u>firmly</u> and <u>squarely</u>. Now squeeze the syringe bulb to blow the "yellow flour" directly into the candle flame. A loud and impressive reaction will occur as the lid explodes from the top of the can. Reaction of the students will very likely be one of great surprise and enthusiasm. Repeat the experiment if they demand. Students may like to try it, and, if done under the supervision of the teacher, should be allowed to do so. Now ask: WHY DID WE DO THIS ACTIVITY? DID THE FOOD HAVE ENERGY? If the responses do not indicate that the students associate the explosion with food energy being released, repeat the experiment and expand the explanation. You may wish to have the students add the flour and set off the explosion. Then ask again: DID THE FOOD HAVE ENERGY? HOW DO YOU KNOW? IN WHAT FORM DID THE FOOD HAVE ENERGY? After the student has observed the explosion and made the inference that food has energy, explain <u>why</u> the can worked (refer to content explanation at beginning of Core B for information).

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
y see the "yellow flour" added, or have a the "yellow flour." Have them stand well he can. Light the candle and place the paint ly and squarely. Now squeeze the syringe w the "yellow flour" directly into the candle oud and impressive reaction will occur as the s from the top of the can.	
the students will very likely be one of great d enthusiasm. Repeat the experiment if they udents may like to try it, and, if done under sion of the teacher, should be allowed to do	
D WE DO THIS ACTIVITY?	--respond, "To find out if there is energy in food."
E FOOD HAVE ENERGY?	--relate the explosion to a sudden release of energy and infer that the food had energy.
f the responses do not indicate that the tudents associate the explosion with food nergy being released, repeat the experiment nd expand the explanation. You may wish to ave the students add the flour and set off he explosion. Then ask again:	
ID THE FOOD HAVE ENERGY?	--respond, "Yes."
OW DO YOU KNOW?	--respond, "The lid blew off," "It blew up," "The lid moved," "It exploded."
N WHAT FORM DID THE FOOD HAVE ENERGY?	--respond, "It was stored," or perhaps "Chemical."
tudent has observed the explosion and made the hat food has energy, explain why the can er to content explanation at beginning of Core nation).	

ACTIVITY 3-9

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MATERIALS

TEACHING STRATEGIES

If there are students who question "yellow flour" as really being food, refer to the explanation of lycopodium (pronounced lye-kuh-pō-dee-um) spores (what they are and how they represent food) in the content explanation of Core B.

Introduce the experimental portion of this activity by saying:

> ON THE TABLE ARE SOME FOODS AND OTHER MATERIALS. USE ANY OF THESE MATERIALS YOU WANT AND SEE IF YOU CAN SHOW THAT FOOD HAS ENERGY STORED IN IT.

The pinwheels, matches, etc., will suggest burning the foods. Allow the students ample time for experimenting. Give no further direction to the class as a whole.

That food has energy may be demonstrated in a variety of ways. Some students may simply ignite the food and measure the heat given off. Others may state that the light given off during burning indicates the release, and hence presence of energy. If students do only this it indicates a recognition or identification of energy, but does not fulfill the demonstration of the "work" criterion for energy. A more complete understanding is established if the student demonstrates and explains that heat from burning food caused the pinwheel to turn.

LOTS OF WORK TIME

After students have had ample opportunity to experiment, ask:

> WHAT DID YOU LEARN ABOUT FOODS AND ENERGY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
students who question "yellow flour" as really efer to the explanation of lycopodium ye-kuh-pó-dee-um) spores (what they are and esent food) in the content explanation of	
experimental portion of this activity by	
ABLE ARE SOME FOODS AND OTHER MATERIALS. OF THESE MATERIALS YOU WANT AND SEE IF SHOW THAT FOOD HAS ENERGY STORED IN IT.	
, matches, etc., will suggest burning the the students ample time for experimenting. er direction to the class as a whole.	--design and perform an experiment which will demonstrate that food contains energy.
energy may be demonstrated in a variety of tudents may simply ignite the food and measure n off. Others may state that the light ing burning indicates the release, and hence nergy. If students do only this it indicates or identification of energy, but does not emonstration of the "work" criterion for re complete understanding is established t demonstrates and explains that heat from caused the pinwheel to turn.	
LOTS OF WORK TIME	
s have had ample opportunity to experiment,	
YOU LEARN ABOUT FOODS AND ENERGY?	--reply, "They burned," "They caught on fire," "They made the pinwheel turn," "They made the wheel work," "Food has energy."

MATERIALS	TEACHING STRATEGIES
	WHAT HAPPENED WHEN YOU LIT THE FOODS WITH A MATCH? DID THE FOODS BURNED GIVE OFF ANY ENERGY? HOW DO YOU KNOW? WHAT DID THE ENERGY DO? Then ask: WHAT ARE SOME OF THE THINGS WE DO THAT CAUSE OUR BODIES TO USE ENERGY? WHERE DO WE GET THE ENERGY? WHAT HAPPENS WHEN WE ARE SLEEPING OR RESTING? DO WE USE ENERGY THEN? Conclude the activity by saying: THIS IS SOMETHING WE WILL TEST IN THE NEXT ACTIVITY.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
HAPPENED WHEN YOU LIT THE FOODS WITH A ?	--respond, "They burned," "Got black."
HE FOODS BURNED GIVE OFF ANY ENERGY?	--infer that foods gave off energy.
O YOU KNOW?	--respond, "They burned," "Made the wheel turn," "They gave off heat and light."
DID THE ENERGY DO?	--respond, "It turned the pinwheel or radiometer."
ARE SOME OF THE THINGS WE DO THAT CAUSE ODIES TO USE ENERGY?	--list activities they perform, such as running, walking, dancing, working, etc.
DO WE GET THE ENERGY?	--identify food as their source of "go power."
HAPPENS WHEN WE ARE SLEEPING OR RESTING? USE ENERGY THEN?	--respond, "Yes," "Maybe," "I don't know."
he activity by saying:	
IS SOMETHING WE WILL TEST IN THE NEXT ITY.	

UNIT III, CORE B
ACTIVITY 3-9: "Energy In Food"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childi ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Worksheet #	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Transparency #	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Were there any problems or accidents related to exploding the can or burning food?
☐ No ☐ Yes: Comment.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B
ACTIVITY 3-9: "Energy In Food"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

2. Appreciate that being alive is a dynamic state requiring energy.

4. Determine that increased activity requires an increased amount of energy.

MATERIALS

*Paper towels or sponges
*Masking tape
*3 Containers per group of 4 students (2- or 3-pound coffee cans, 1/2-gallon milk cartons, or something similar)

(Continued on next page)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-10. It Takes Energy To Live

This activity will concern itself with the solution of the problem posed at the end of the previous activity: "Do we use energy when asleep or resting?" This activity will demonstrate that the state of being alive is an energy-consuming activity and that when energy is used by the body, some of it is released in the form of heat. That increased activity increases the demand for energy will also be illustrated.

Teacher Preparation:

1. Have ice cubes available for lowering the temperature of tap water.

2. Paper towels or sponges should be available to wipe up water spills.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

ACTIVITY 3-10. IT TAKES ENERGY TO LIVE

BSCS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

B OBJECTIVES:

2. Appreciate that being alive is a dynamic state requiring energy.

4. Determine that increased activity requires an increased amount of energy.

TEACHING STRATEGIES

-10. It Takes Energy To Live

ity will concern itself with the solution of m posed at the end of the previous activity: energy when asleep or resting?" This activity strate that the state of being alive is an suming activity and that when energy is used y, some of it is released in the form of heat. ased activity increases the demand for energy be illustrated.

eparation:

ice cubes available for lowering the erature of tap water.

r towels or sponges should be available to up water spills.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have supported or changed his ideas about using energy when sleeping or resting.
--have performed his assigned portion of the temperature experiment.
--have completed Worksheets 3-10 and 3-11.
--have explained that the temperature increased in containers C and B because the body gives off heat energy, but that an actively moving hand gives off more heat.
--have said either that the body gives off heat while resting or that the experiment hasn't answered the question.

ACTIVITY 3-10

84

MATERIALS

3 Metal-backed thermometers per group of 4 students
*Ice
*Timer, clock, or watch with second hand
Thermometer, demonstration model
*Felt tip pens (black, green, red)
Worksheet 3-10
Slide 3-19
Worksheet 3-11
Slide 3-20
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Begin by stating:

WE ENDED OUR LAST ACTIVITY BY ASKING, "DO WE USE ENERGY WHEN WE ARE ASLEEP OR RESTING?" HOW MANY THINK WE DO? HOW MANY THINK WE DON'T?

HOW DO WE KNOW A CANDLE RELEASES ENERGY?

HOW DO WE KNOW A STOVE RELEASES ENERGY?

HOW COULD WE TELL IF OUR BODY RELEASES ENERGY?

HOW COULD WE TELL IF OUR BODY GIVES OFF HEAT?

Now say:

LET'S PERFORM AN EXPERIMENT TO SEE IF OUR BODY GIVES OFF ENERGY WHILE WE REST. TO DO THIS, THOUGH, WE MUST BE SURE WE CAN CORRECTLY USE AND READ A THERMOMETER.

Instruction in the use of the thermometer is introduced in Unit I, Core B, Activities 1-19 and 1-20. In most cases the thermometer exercises here will be a review.

Display the thermometer demonstration model. By indicating different temperatures on the model, allow each student to practice reading temperatures.

Distribute the student thermometers. Circulate about the room asking each student to read to you the temperature on the thermometer. Have each student hold the bulb between thumb and forefinger and read again. This provides additional practice and an opportunity for the students to see how their data can be affected if the thermometers are not handled properly.

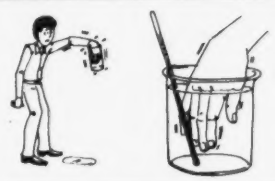
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ting:	
D OUR LAST ACTIVITY BY ASKING, "DO WE USE WHEN WE ARE ASLEEP OR RESTING?" HOW MANY E DO? HOW MANY THINK WE DON'T?	--signify their opinions by raising hands.
WE KNOW A CANDLE RELEASES ENERGY?	--recall, "It gives off heat," "It gives off light."
WE KNOW A STOVE RELEASES ENERGY?	--respond, "It gives off heat."
LD WE TELL IF OUR BODY RELEASES ENERGY?	--infer, "It uses energy if it gives off heat."
LD WE TELL IF OUR BODY GIVES OFF HEAT?	--respond, "Measure our temperature."
ERFORM AN EXPERIMENT TO SEE IF OUR BODY FF ENERGY WHILE WE REST. TO DO THIS, THOUGH, BE SURE WE CAN CORRECTLY USE AND READ A ETER.	
in the use of the thermometer is introduced ore B, Activities 1-19 and 1-20. In most ermometer exercises here will be a review.	
thermometer demonstration model. By indicating mperatures on the model, allow each student to ing temperatures.	--read thermometer temperatures on model.
he student thermometers. Circulate about ing each student to read to you the temperature ometer. Have each student hold the bulb b and forefinger and read again. This provides ractice and an opportunity for the students heir data can be affected if the thermometers ed properly.	--read temperatures on their own thermometers.

MATERIALS

Slide 3-19

Worksheet 3-10

Date_____ Name_____



Minutes	Temperature of water		
	No hand	Quiet hand	Moving hand
0			
2			
4			
6			

TEACHING STRATEGIES

Divide the class into teams of four (three thermometer readers and one hand mover). Briefly explain to the teams what they will be doing by saying:

> IN THIS EXPERIMENT WE'RE GOING TO PUT WATER IN SOME CONTAINERS, PUT OUR HANDS IN THE WATER, AND WITH THE HELP OF OUR THERMOMETERS, OBSERVE ANY CHANGES THAT MAY TAKE PLACE.

Distribute Worksheet 3-10, materials, and project Slide 3-19 of the worksheet. Using only one t of materials, explain and, with four students, carry out the following procedures:

1. Label the three containers "no hand," "quiet hand," and "moving hand."
2. Fill each of the containers one-half full of tap water. Make sure all the containers are filled with equal amounts of water.
3. Tape a thermometer in position with transparent tape so that the bulb is under the water.
4. Place ice in each container until the temperature drops to 55° F.
5. Remove all ice when the water drops to 55°.

When the three containers are ready, select four students to demonstrate the experimental tasks.

Ask:

> WHAT IS THE TEMPERATURE IN EACH OF THE CONTAINERS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
class into teams of four (three thermometer one hand mover). Briefly explain to the teams ll be doing by saying: S EXPERIMENT WE'RE GOING TO PUT WATER IN ONTAINERS, PUT OUR HANDS IN THE WATER, AND HE HELP OF OUR THERMOMETERS, OBSERVE ANY S THAT MAY TAKE PLACE. Worksheet 3-10, materials, and project Slide worksheet. Using only one set of materials, with four students, carry out the following the three containers "no hand," "quiet hand," oving hand." ach of the containers one-half full of tap Make sure all the containers are filled qual amounts of water. thermometer in position with transparent so that the bulb is under the water. ice in each container until the temperature to 55° F. all ice when the water drops to 55°. ee containers are ready, select four students te the experimental tasks. S THE TEMPERATURE IN EACH OF THE CONTAINERS?	Students: --read correctly the thermometer in each container and state the temperature.

MATERIALS

TEACHING STRATEGIES

Check any discrepancies in temperature that may have occurred. If necessary, add more ice or warm water so that the water in each container is 55° F. Record the beginning temperatures on the board.

Give the following directions to the students selected to demonstrate:

> (First student's name), PLACE ONE HAND IN THE "QUIET-HAND" CONTAINER AND YOUR OTHER HAND IN THE "MOVING-HAND" CONTAINER. KEEP ONE HAND PERFECTLY STILL AS IF YOU WERE IN A DEEP SLEEP, BUT AT THE SAME TIME MOVE THE FINGERS ON YOUR OTHER HAND CONSTANTLY AND RAPIDLY. KEEP BOTH HANDS COMPLETELY UNDER WATER.
>
> (Second student's name), WATCH CAREFULLY THE THERMOMETER IN THE CONTAINER WITH THE MOVING HAND. READ THE TEMPERATURE WHEN I TELL YOU THAT TWO MINUTES ARE UP, AND AGAIN AT FOUR AND AT SIX MINUTES. RECORD THE TEMPERATURES ON YOUR WORKSHEET.
>
> (Third student's name), WATCH THE THERMOMETER IN THE CONTAINER WITH THE QUIET HAND. READ THE TEMPERATURE AFTER TWO MINUTES AND AGAIN AFTER FOUR AND AFTER SIX MINUTES. RECORD THE TEMPERATURES ON YOUR WORKSHEET.
>
> (Fourth student's name), AFTER TWO MINUTES, AND AGAIN AFTER FOUR AND AFTER SIX MINUTES, READ THE TEMPERATURE IN THE CONTAINER THAT HAS ONLY WATER IN IT. RECORD THE TEMPERATURES ON YOUR WORKSHEET.

When two minutes have passed, tell those appointed to read the thermometers that they should read the temperatures. It has been advised that the thermometers be taped to the inside of the can. If, however, the thermometer must be removed from the water to be read, instruct the

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
liscrepancies in temperature that may have If necessary, add more ice or warm water so ater in each container is 55° F. Record the emperatures on the board. ollowing directions to the students selected to e: student's name), PLACE ONE HAND IN THE T-HAND" CONTAINER AND YOUR OTHER HAND IN MOVING-HAND" CONTAINER. KEEP ONE HAND CTLY STILL AS IF YOU WERE IN A DEEP SLEEP, T THE SAME TIME MOVE THE FINGERS ON YOUR HAND CONSTANTLY AND RAPIDLY. KEEP BOTH COMPLETELY UNDER WATER. d student's name), WATCH CAREFULLY THE METER IN THE CONTAINER WITH THE MOVING READ THE TEMPERATURE WHEN I TELL YOU WO MINUTES ARE UP, AND AGAIN AT FOUR SIX MINUTES. RECORD THE TEMPERATURES R WORKSHEET. student's name), WATCH THE THERMOMETER CONTAINER WITH THE QUIET HAND. READ MPERATURE AFTER TWO MINUTES AND AGAIN FOUR AND AFTER SIX MINUTES. RECORD THE ATURES ON YOUR WORKSHEET. h student's name), AFTER TWO MINUTES, AND AFTER FOUR AND AFTER SIX MINUTES, READ THE ATURE IN THE CONTAINER THAT HAS ONLY IN IT. RECORD THE TEMPERATURES ON YOUR EET. nutes have passed, tell those appointed to ermometers that they should read the tempera- has been advised that the thermometers be taped de of the can. If, however, the thermometer oved from the water to be read, instruct the	

MATERIALS	TEACHING STRATEGIES
	students to do so quickly and then return the thermometer to the water. Explain that the thermometer must be read quickly. If the thermometer is removed from the water for very long, the temperature will change because the air is warmer than the water. Demonstrate how to record the temperatures by doing so on the projected worksheet. Have the students again read the temperatures after four minutes and after six minutes. Again record the results. This initial activity by one group of students is to familiarize the class with the procedure to be followed and to provide additional practice in reading the thermometers. Ask: WHY DIDN'T WE PUT ANYTHING INTO THE WATER IN THIS CONTAINER? (Point to "no-hand" container.) If students do not recognize the purpose of the "no-hand" container tell them that it serves as a comparison--to determine if any change occurs with no hand in the water. Now ask: WHAT ARE WE TRYING TO FIND OUT BY DOING THIS EXPERIMENT? Students may not recognize the purpose of the experiment at this point. If not, repeat the question strategy at the beginning of this activity. Now repeat the entire experiment with all teams participating. Instruct those reading the thermometers to record

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
o do so quickly and then return the thermometer er. Explain that the thermometer must be read If the thermometer is removed from the water for the temperature will change because the air is n the water.	
e how to record the temperatures by doing so jected worksheet. Have the students again read atures after four minutes and after six minutes. rd the results. This initial activity by one tudents is to familiarize the class with the to be followed and to provide additional practice the thermometers.	
IDN'T WE PUT ANYTHING INTO THE WATER IS CONTAINER? (Point to "no-hand" iner.)	--suggest that this container is for comparison purposes to see if the water temperature changes with nothing in it.
s do not recognize the purpose of the "no-hand" tell them that it serves as a comparison--to if any change occurs with no hand in the water.	
ARE WE TRYING TO FIND OUT BY DOING THIS IMENT?	--conclude that they are experimenting to see if their bodies give off energy when they are not moving, while they sleep.
ay not recognize the purpose of the experiment int. If not, repeat the question strategy at ing of this activity.	
the entire experiment with all teams partici- nstruct those reading the thermometers to record	

MATERIALS

TEACHING STRATEGIES

the temperatures on their worksheets. Give the signal every two minutes for temperatures to be read and recorded. Be sure to add ice until the water in all three containers is again brought down to 55°, after which remove the ice. Be sure also that beginning temperatures are recorded.

When all the readings have been taken, make sure each student completes his worksheet to have a record of temperatures in all three containers at each time period. Then ask:

WHICH CONTAINER HAS THE MOST HEAT ENERGY NOW?

HOW DO YOU KNOW?

WHERE DID THE HEAT ENERGY COME FROM?

DID THE TEMPERATURE GO UP IN THE CONTAINER WITH THE QUIET HAND?

WHY?

Some students may indicate that the quiet hand felt the coldest and therefore must have given off the most energy. Explain that since we don't use as much energy when we are resting not enough energy was being used to keep it warm.

WHICH HAND GAVE OFF THE MOST HEAT ENERGY?

WHY DID THE TEMPERATURE IN THE CONTAINER WITH THE MOVING HAND CHANGE THE MOST?

WHAT DID THE HAND USE WHEN IT WAS MOVING?

DID THE TEMPERATURE IN THE "NO-HAND" CONTAINER CHANGE?

Stu

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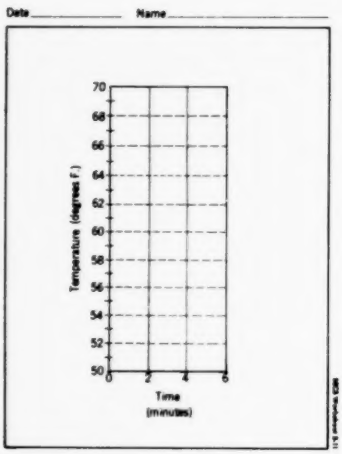
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
tures on their worksheets. Give the signal nutes for temperatures to be read and recorded. dd ice until the water in all three containers ught down to 55°, after which remove the ice. that beginning temperatures are recorded.	
readings have been taken, make sure each letes his worksheet to have a record of in all three containers at each time period.	
ONTAINER HAS THE MOST HEAT ENERGY NOW?	--conclude that the "moving-hand" container has the most heat energy.
YOU KNOW?	--respond, "It has the highest temperature."
ID THE HEAT ENERGY COME FROM?	--respond, "The hand," "Moving the hand."
TEMPERATURE GO UP IN THE CONTAINER WITH ET HAND?	--respond, "Yes."
s may indicate that the quiet hand felt the therefore must have given off the most energy. since we don't use as much energy when we are enough energy was being used to keep it warm.	--infer that a resting hand also gives off energy.
AND GAVE OFF THE MOST HEAT ENERGY?	--respond, "The right hand," "The working hand."
THE TEMPERATURE IN THE CONTAINER E MOVING HAND CHANGE THE MOST?	--infer that it takes energy to move something, and the more movement, the more energy released.
D THE HAND USE WHEN IT WAS MOVING?	--conclude that when energy is used by the body, some of it is released in the form of heat.
TEMPERATURE IN THE "NO-HAND" CONTAINER	--respond, "Yes."

MATERIALS



Slide 3-20

Worksheet 3-11

TEACHING STRATEGIES

WHERE DID ITS HEAT ENERGY COME FROM?

WHAT WAS THE MAIN CAUSE OF THE TEMPERATURE CHANGE IN THE CONTAINERS WITH THE HANDS?

DO WE RELEASE ENERGY WHEN WE ARE RESTING AND ASLEEP?

If students respond with "no," have a student sit or lie perfectly still and ask:

IS (student's name) USING ENERGY?

HOW DO YOU KNOW WE RELEASE ENERGY WHEN WE ARE RESTING OR ASLEEP?

Now ask:

DOES ANYONE REMEMBER HOW WE CAN SHOW INFORMATION WITHOUT WRITING WORDS?

> If not, say:
>
> TO SEE WHAT HAS HAPPENED IN THE CONTAINERS WE ARE GOING TO MAKE A GRAPH.

Distribute Worksheet 3-11, project Slide 3-20 and ask:

WHAT WAS THE TEMPERATURE OF THE WATER IN THE "NO-HAND" CONTAINER WHEN WE STARTED?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
: DID ITS HEAT ENERGY COME FROM?	--infer from the air, from the room.
WAS THE MAIN CAUSE OF THE TEMPERATURE E IN THE CONTAINERS WITH THE HANDS?	--respond, "My hands," "My hands are warm."
: RELEASE ENERGY WHEN WE ARE RESTING AND P?	--infer that we do release energy when resting; that the body uses energy just to stay alive.
s respond with "no," have a student sit or lie still and ask:	
tudent's name) USING ENERGY?	--infer, "Yes." Even when a person is lying perfectly still the chest will still be moving slightly as a result of breathing, or the pulse can be felt and his body will continue to give off heat.
O YOU KNOW WE RELEASE ENERGY WHEN WE ARE NG OR ASLEEP?	--associate the resting hand in the experiment with resting and conclude that we use energy when at rest.
ANYONE REMEMBER HOW WE CAN SHOW INFORMATION UT WRITING WORDS?	--recall, "Make a graph."
If not, say:	
TO SEE WHAT HAS HAPPENED IN THE CONTAINERS WE ARE GOING TO MAKE A GRAPH.	
Worksheet 3-11, project Slide 3-20 and ask:	
WAS THE TEMPERATURE OF THE WATER IN THE AND" CONTAINER WHEN WE STARTED?	--read from worksheet or recall beginning temperature.

MATERIALS

TEACHING STRATEGIES

WHO CAN SHOW US WHERE TO MARK THE STARTING TEMPERATURE ON THE GRAPH?

Place a dot at the correct temperature on the projected graph. Direct students to place a dot at the same location on their worksheets. Check individual graphs and help those who are having problems.

Now ask:

WHAT WAS THE TEMPERATURE IN THE "NO-HAND" CONTAINER AFTER TWO MINUTES? FOUR MINUTES? SIX MINUTES?

This time have the students refer to their own data for the appropriate temperature to put on the graph.

When the appropriate dots have been placed on the graphs, have the students connect the points using a black felt tip pen or soft lead pencil. Label the line "no hand".

Ask your best student to repeat the demonstration of how points are placed on the graph using the data from the "quiet-hand" container. Instruct students to connect dots using a green pen or marker. Label this line "quiet hand".

CLUES TO SUC

Without demonstrating, have students graph data for the "moving-hand" container, using a red marker to connect the dots. Label this line "moving hand". Individual help may be necessary.

Stu

--l

--p

--s

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
N SHOW US WHERE TO MARK THE STARTING ATURE ON THE GRAPH?	--locate the appropriate coordinates.
at the correct temperature on the projected ect students to place a dot at the same their worksheets. Check individual graphs ose who are having problems.	--place dots on graph at correct location.
AS THE TEMPERATURE IN THE "NO-HAND" CONTAINER TWO MINUTES? FOUR MINUTES? SIX MINUTES?	--state correct temperatures.
ave the students refer to their own data ropriate temperature to put on the graph.	
propriate dots have been placed on the graphs, udents connect the points using a black felt soft lead pencil. Label the line "no hand".	
st student to repeat the demonstration of how placed on the graph using the data from the " container. Instruct students to connect dots en pen or marker. Label this line "quiet	
onstrating, have students graph data for the d" container, using a red marker to connect Label this line "moving hand". Individual necessary.	

CLUES TO SUCCESS

GRAPH
CONSTRUCTION TIME

MATERIALS	TEACHING STRATEGIES
	When graphs have been completed, ask: IN WHICH DIRECTION DO OUR LINES GO? WHAT DOES THAT TELL US ABOUT WHAT HAS HAPPENED TO THE TEMPERATURE OF THE WATER IN THE CONTAINERS? DID IT GO UP IN ALL THREE CONTAINERS WHEN WE MEASURED IT AT THE DIFFERENT TIMES? DID THE TEMPERATURE GO UP THE SAME NUMBER OF DEGREES IN ALL THE CONTAINERS? WHY DIDN'T THEY ALL GO UP THE SAME? WHICH OF THE LINES ON OUR GRAPH SHOWS US IN WHICH CONTAINER THE TEMPERATURE WENT UP THE MOST? WHY DID THE TEMPERATURE GO UP THE MOST IN THIS CONTAINER? WHY DID THE MOVING HAND CAUSE THE TEMPERATURE TO GO UP MOST? Collect the data recorded and graphs (Worksheets 3-10 and 3-11), and keep them together by the teams in which they worked so that you can compare their papers when you complete Tallysheet 3-5.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ns have been completed, ask:	Students:
HICH DIRECTION DO OUR LINES GO?	--respond, "Up."
DOES THAT TELL US ABOUT WHAT HAS HAPPENED HE TEMPERATURE OF THE WATER IN THE CONTAINERS?	--infer that the temperature has gone up.
IT GO UP IN ALL THREE CONTAINERS WHEN WE URED IT AT THE DIFFERENT TIMES?	--respond, "Yes." (All three should show increases, although the "no-hand" container should show only a slight increase.)
THE TEMPERATURE GO UP THE SAME NUMBER OF EES IN ALL THE CONTAINERS?	--respond, "No."
DIDN'T THEY ALL GO UP THE SAME?	--respond, "They didn't all have the same energy."
H OF THE LINES ON OUR GRAPH SHOWS US IN H CONTAINER THE TEMPERATURE WENT UP THE ?	--signify the top line, or the green line.
DID THE TEMPERATURE GO UP THE MOST IN THIS AINER?	--respond, "Because the hand was moving."
DID THE MOVING HAND CAUSE THE TEMPERATURE D UP MOST?	--reply, "It had more energy," "It gave off more energy."
ne data recorded and graphs (Worksheets 3-10 and d keep them together by the teams in which they that you can compare their papers when you Tallysheet 3-5.	

Teacher _____

Date _____

UNIT III, CORE B
TALLYSHEET 3-5: Tabulation of Worksheet 3-11
ACTIVITY 3-10: "It Takes Energy To Live"

Column 1: Graphing the Data. Sort out student worksheets by the teams in which they worked as the data recorded by each team will differ. Compare the graphs of the no-hand temperature of the four students in each team and notice if they are identical. If any student has incorrectly graphed the data, make a check in the Error column below. If graphing is accurate check the OK column. You may need to refer to Worksheet 3-10 to verify the temperatures that were recorded. This will indicate whether each student understood what was to be done and was able to follow directions to graph the information.

Column 2: Graphing On Own. Look at each student's graph of the moving-hand temperatures. Compare what was graphed with what the group recorded. If correctly graphed, check the OK column. If the entry is on the wrong temperature or time line, check temp. or time (or both). If there is some other problem with this graph, briefly explain in the Other Problem column. This will tell you whether students understand how to graph and, if not, what problems need to be worked on.

		1 (Graphing the data)		2 (Graphing on own)			
	KEY:	OK	Error	OK	Temp.	Time	Other Problems
Attach ID list here.	01						

KEY:	OK	Error	OK	Temp.	Time	Other Problems
Attach ID list here. 01						
TOTALS:	___	___	___	___	___	

Does this summary give an accurate indication of each student's understanding of graphing?

☐ Yes ☐ No

If not, what other evidence do you have, and which students are affected?

UNIT III, CORE B

ACTIVITY 3-10: "It Takes Energy To Live"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did students have difficulty taking temperatures accurately and recording them correctly on Worksheet 3-10?
☐ No ☐ Yes: Comment.

18. Were any students confused by the three graphs on one sheet?
☐ No ☐ Yes: Comment.

19. Please complete Tallysheet 3-5 of Worksheet 3-11 and send in with this feedback sheet.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

BSCS Evaluation: EMH Feedback Form 1c

UNIT III, CORE B
ACTIVITY 3-10: "It Takes Energy To Live"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

3. Determine that different foods have different amounts of energy.

MATERIALS

1 Equal-arm balance kit/group
*Objects to weigh (paper clips, pennies, other coins, erasers, life savers, pencils, rubber stoppers, ping pong balls, popped popcorn, styrofoam balls, marbles, dried peas and beans, wooden and rubber balls, etc.)
*Pliers or strong scissors
*Felt tip pens

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-11. Measuring With A Balance

In this activity the students will be introduced to a simple balance and given the opportunity to develop some degree of skill in using it. This skill is necessary in order to weigh equal portions of food in Activity 3-12. Later activities in this program will also require the use of a balance.

Teacher Preparation:

Proper care of the balance and bead sets will avoid future problems. It is important to use the same balance with the same set of beads throughout the year; therefore you should number the balances and bead sets. Discourage bead swapping since beads in the same string have nearly the same mass but beads in other chains may differ. Be sure to cut each set from the same string.

To be sure that the balances are working properly, check the following for each balance before class:

1. With both pans empty see that:

   a. The sliding weight on the right-hand arm of the balance beam is as close to the center as it can go.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

ACTIVITY 3-11. MEASURING WITH A BALANCE

BSCS

OCUS FOR THIS ACTIVITY

OALS:

Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

Determine that different foods have different amounts of energy.

TEACHING STRATEGIES

1. Measuring With A Balance

vity the students will be introduced to a ce and given the opportunity to develop some ill in using it. This skill is necessary in gh equal portions of food in Activity 3-12. ties in this program will also require the ance.

paration:

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that the balances are working properly, check ng for each balance before class:

oth pans empty see that:

e sliding weight on the right-hand arm of the lance beam is as close to the center as it n go.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have weighed and recorded accurately a variety of objects, using the equal-arm balance.
--have observed that objects which vary in volume may have the same, or very nearly the same, weight.

MATERIALS

TEACHING STRATEGIES

b. Move the sliding weights on each arm of the balance beam so that the pointer swings freely equal distances on either side of the pointer scale. (The pointer does not have to stop at zero, only swing equal distances on either side.)

When the above two conditions are met, the scale is properly balanced.

2. If the pointer does not swing equal distances, adjust the sliding weight on the left-hand arm of the beam. If it still does not balance try switching balance pans. (Mark the pans "L" and "R" with a permanent felt marking pen so the students will always use the pans on the correct sides.)

3. If any pointer still does not balance it may be necessary to add a piece of masking tape or rubber band to one beam arm in order to get a zero balance.

4. The zero setting should be checked each day the balance is used since handling or an uneven table top will require changing the position of the zero adjusting sliding weight.

5. Cut the bead chains to proper lengths with pliers or strong scissors. Use care in cutting so that the short metal pin connecting one bead to another is cut as close to the center as possible. (Hang the string from one end and cut while hanging.)

6. A set of beads of the following chain lengths is convenient to use:

   1 chain of 100 beads
   1 chain of 50 beads
   2 chains of 20 beads
   1 chain of 10 beads

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
e the sliding weights on each ar of the ance beam so that the pointer swings freely al distances on either side of the pointer le. (The pointer does not have to stop zero, only swing equal distances on either e.) e above two conditions are met, the scale is y balanced. pointer does not swing equal distances, the sliding weight on the left-hand arm of m. If it still does not balance try ng balance pans. (Mark the pans "L" and h a permanent felt marking pen so the students ways use the pans on the correct sides.) pointer still does not balance it may be ry to add a piece of masking tape or rubber one beam arm in order to get a zero . o setting should be checked each day the is used since handling or an uneven table l require changing the position of the justing sliding weight. bead chains to proper lengths with pliers ng scissors. Use care in cutting so that rt metal pin connecting one bead to another as close to the center as possible. (Hang ing from one end and cut while hanging.) f beads of the following chain lengths is ent to use: of 100 beads of 50 beads of 20 beads of 10 beads	

MATERIALS	TEACHING STRATEGIES
	1 chain of 5 beads 2 chains of 2 beads 5 single beads Begin the activity period by saying: IN ORDER FOR SCIENTISTS TO DO EXPERIMENTS PROPERLY THEY OFTEN NEED TO WEIGH SOME OF THE MATERIALS THEY WILL BE EXPERIMENTING WITH. SINCE WE WILL BE DOING SOME EXPERIMENTS WHERE IT IS NECESSARY TO WEIGH THINGS, WE MUST LEARN TO USE A BALANCE CORRECTLY. Divide the students into groups of three. Distribute equal-arm balance kits to each group. Allow students to use the scales to weigh things. Be sure that they use beads as measures of weight. Give them a chance to discover how the balances operate. Caution them that the scales will not tolerate rough treatment and that they should not attempt to weigh large or heavy objects. Each team should list the objects they weigh and record the weight in beads. Provide no further instructions or comments until the students have ample opportunity to practice on their own. Circulate among the groups, offering suggestions and answering questions. It may be necessary to demonstrate to individuals or small groups how to use the balance if they appear to be having difficulty. Provide them with objects to weigh if necessary. You may wish to suggest such activities as comparing the weight of a penny or nickel to that of a quarter. Encourage groups to exchange objects and compare measurements with each other. Continue to work with groups or students individually until you are satisfied they can operate the balances

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ain of 5 beads ains of 2 beads ngle beads activity period by saying: DER FOR SCIENTISTS TO DO EXPERIMENTS RLY THEY OFTEN NEED TO WEIGH SOME OF ATERIALS THEY WILL BE EXPERIMENTING SINCE WE WILL BE DOING SOME EXPERIMENTS IT IS NECESSARY TO WEIGH THINGS, WE MUST TO USE A BALANCE CORRECTLY. students into groups of three. Distribute equal- e kits to each group. ents to use the scales to weigh things. Be sure use beads as measures of weight. Give them a discover how the balances operate. Caution them cales will not tolerate rough treatment and that d not attempt to weigh large or heavy objects. should list the objects they weigh and record in beads. Provide no further instructions or ntil the students have ample opportunity to n their own. among the groups, offering suggestions and questions. It may be necessary to demonstrate uals or small groups how to use the balance pear to be having difficulty. Provide them ts to weigh if necessary. You may wish to ch activities as comparing the weight of a ickel to that of a quarter. Encourage groups e objects and compare measurements with each work with groups or students individually are satisfied they can operate the balances	Students: --use the balance to weigh a variety of objects and express the weight in numbers of beads.

MATERIALS

TEACHING STRATEGIES

properly. See that each student has a chance to weigh and that one person does not dominate a particular group of students.

While the balance is capable of weighing objects to less than a whole bead it will probably never be necessary in this program to weigh with such precision. By weighing only to the nearest bead, the students will become familiar with the balance without the added confusion of making sliding weight adjustments for each weighing.

WEIGHING TIM

When the weighing has been concluded encourage the students to compare their results. Say:

HOW MANY OF YOU WEIGHED A PENNY?

(Student), HOW MANY BEADS DID YOUR PENNY WEIGH?

Write "PENNY" on the board and its weight in beads. Ask other students for the weights of their pennies. Record their answers on the board. Repeat this strategy for a variety of objects. Praise students for accuracy when it is achieved, and discuss any problems some may have had with the balance.

Conclude by asking:

WHAT DID YOU FIND OUT ABOUT DIFFERENT OBJECTS BY WEIGHING THEM?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
e that each student has a chance to weigh person does not dominate a particular group	
ance is capable of weighing objects to less bead it will probably never be necessary in to weigh with such precision. By weighing earest bead, the students will become familiar nce without the added confusion of making t adjustments for each weighing.	
WEIGHING TIME	
ning has been concluded encourage the ompare their results. Say:	
OF YOU WEIGHED A PENNY?	--raise their hands.
), HOW MANY BEADS DID YOUR PENNY WEIGH?	--state the number of beads.
on the board and its weight in beads. Ask s for the weights of their pennies. Record on the board. Repeat this strategy for a jects. Praise students for accuracy when d, and discuss any problems some may have had nce.	
sking:	
YOU FIND OUT ABOUT DIFFERENT OBJECTS ING THEM?	--comment about greater differences in weight than expected, "Some things look heavy but aren't," "Some small things weigh more than bigger things."

UNIT III, CORE B

ACTIVITY 3-11: "Measuring With A Balance"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

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	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
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12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did students encounter any difficulty in balancing or using the balances?
☐ No ☐ Yes: Comment.

18. In your judgment, how many students are not able to accurately use the balance in weighing something?
☐ None ☐ 1/4 ☐ 1/2 ☐ All: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B
ACTIVITY 3-11: "Measuring With A Balance"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.

3. Determine that different foods have different amounts of energy.

4. Determine that increased activity requires an increased amount of energy.

MATERIALS

TEACHING STRATEGIES

Activity 3-12. Measuring Energy Values

During this activity students will build a calorimeter, which they will use to measure energy values of foods. A calorimeter is an apparatus for measuring amounts of heat, literally a "calorie measurer."

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

B OBJECTIVES:

1. Recognize that food is our main source of energy.

3. Determine that different foods have different amounts of energy.

4. Determine that increased activity requires an increased amount of energy.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

BSCS

ACTIVITY 3-12. MEASURING ENERGY VALUES

TEACHING STRATEGIES

3-12. Measuring Energy Values

is activity students will build a calorimeter, y will use to measure energy values of foods. eter is an apparatus for measuring amounts of erally a "calorie measurer."

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have followed directions correctly to help make a calorimeter.
--have explained that to compare the energy in different foods one must work with equal amounts.
--have weighed equal portions of a variety of foods.
--have tested by burning a variety of foods.
--have completed Worksheet 3-12.
--have said that the food that caused the greatest temperature change had the most energy.
--have explained that the number of calories in food is related to the amount of energy in food; the more calories, the more go-power the food has.
--have defined "calorie" as referring to the amount of energy in foods.

ACTIVITY 3-12

MATERIALS

*Pliers
Balances
*35mm Slide projector
*Can openers (can punch and standard opener)
*Large juice can (4" diameter, 7" tall)
Large Pyrex test tubes
*Pencils or sticks
Black rubber washers
*A piece of 1/4" hardware cloth, 3" square, for each group
*Matches (preferably fireplace type)
Metal-backed thermometers
Two beakers per group
*Hot pads
*Food (walnuts, marshmallows, potato chips, bacon)
Worksheet 3-12
Slide 3-21
Slide 3-22
Worksheet 3-13
Slide 3-23
*12" String
*Calorie book, *Calorie Counter*, Dell Pub. Co., 1972, 750 Third Ave., N.Y., N.Y. 10017)
*Aluminum foil
Camera (Polaroid Square Shooter)
Polaroid film
Flash bulbs

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. This activity will likely take two or three class periods. For this reason it is divided into four parts: constructing the calorimeter, weighing food portions, burning foods, and discussion. It is recommended you do not attempt to complete all parts of this activity in one session.

2. Not all foods burn well, therefore it is highly recommended that the following foods be used to insure maximum success: miniature marshmallows, walnut chips, potato chips, very crisp dry bacon (prepared ahead of time). (Students may by interested in trying other foods; most foods will not burn successfully, when students use this simple apparatus, however, because of its makeup and/or high water content.)

Part I. Constructing The Calorimeter

Begin by asking:

IN ONE OF OUR EARLIER ACTIVITIES WE STUDIED FOOD TO FIND OUT IF IT HAS ENERGY. IS THERE ENERGY IN FOOD?

DO YOU THINK THAT ALL FOODS HAVE THE SAME AMOUNT OF ENERGY STORED IN THEM?

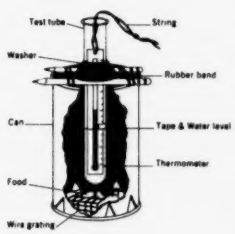
LET'S BUILD A SCIENTIFIC INSTRUMENT TO HELP US FIND OUT IF THERE ARE DIFFERENT AMOUNTS OF ENERGY IN DIFFERENT FOODS. SUCH AN INSTRUMENT IS CALLED A CALORIMETER (pronounced kal-o-rim-é-ter). (Write the term on the board.) IT MEASURES THE AMOUNT OF HEAT FOOD GIVES OFF WHEN WE BURN IT.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ration:	
tivity will likely take two or three class . For this reason it is divided into four constructing the calorimeter, weighing food s, burning foods, and discussion. It is nded you do not attempt to complete all parts activity in one session.	
foods burn well, therefore it is highly nded that the following foods be used to maximum success: miniature marshmallows, chips, potato chips, very crisp dry prepared ahead of time). (Students may rested in trying other foods; most foods t burn successfully, when students use mple apparatus, however, because of its and/or high water content.)	
tructing The Calorimeter	
ng:	
F OUR EARLIER ACTIVITIES WE STUDIED FIND OUT IF IT HAS ENERGY. IS THERE N FOOD?	--recall previous activities and respond, "Yes."
HINK THAT ALL FOODS HAVE THE SAME F ENERGY STORED IN THEM?	--respond, "Yes," "No," "I doubt it," "Depends on how heavy they are."
ILD A SCIENTIFIC INSTRUMENT TO HELP OUT IF THERE ARE DIFFERENT AMOUNTS OF N DIFFERENT FOODS. SUCH AN INSTRUMENT D A CALORIMETER (pronounced kal-o-rim-é-ter). he term on the board.) IT MEASURES THE F HEAT FOOD GIVES OFF WHEN WE BURN IT.	

MATERIALS

Slide 3-21

Worksheet 3-12



TEACHING STRATEGIES

Divide the class into groups of two or three. Distribute the calorimeter materials and allow the students to construct the calorimeter apparatus.

Distribute Worksheet 3-12 to each student. It is a diagram of the calorimeter for students to refer to as they are constructing the apparatus. Project Slide 3-21 of Worksheet 3-12 and give the following instructions:

1. Remove paper from the can.

2. Using a can punch (beer can opener) make eight or nine holes around the bottom edge of the can.

3. Using a standard can opener, cut out the top and bottom of the can.

4. Bend the triangular points (from the punch cuts) back over the bottom edge so they do not stick out into the center of the can. <u>These cuts are very sharp and must be bent carefully</u>.

5. Bend down edges of hardware cloth (screening) to form a grate. Check to see that the can fits easily over the grating.

6. Lubricate the test tube and slip the toilet washer on from the bottom to about 2" from the top with the wide edge down. If a washer is not available it may be possible to substitute one or two heavy rubber bands.

7. Join two pencils or dowel sticks together with rubber bands.

8. Pulling pencils apart, slip the test tube through the pencils so that the bottom of the washer rests on the pencils.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
class into groups of two or three. Distribute eter materials and allow the students to he calorimeter apparatus. Worksheet 3-12 to each student. It is a diagram rimeter for students to refer to as they are g the apparatus. Project Slide 3-21 of -12 and give the following instructions: e paper from the can. a can punch (beer can opener) make eight or holes around the bottom edge of the can. a standard can opener, cut out the top and n of the can. the triangular points (from the punch cuts) over the bottom edge so they do not stick nto the center of the can. These cuts ery sharp and must be bent carefully. down edges of hardware cloth (screening) to a grate. Check to see that the can fits y over the grating. cate the test tube and slip the toilet r on from the bottom to about 2" from the ith the wide edge down. If a washer is not able it may be possible to substitute one o heavy rubber bands. two pencils or dowel sticks together with r bands. ng pencils apart, slip the test tube through encils so that the bottom of the washer on the pencils.	

MATERIALS

TEACHING STRATEGIES

9. Tie a 12" length of string to the top of the thermometer.

10. Place a small piece of masking tape on the test tube 3" from the bottom. This will mark the water level to be used when the food is burned.

11. Place the thermometer in the test tube. Make sure the string is hanging outside the can so that it does not catch fire while the food is burning.

Check to see that the calorimeters are constructed properly, giving assistance where necessary. You may take a picture of each team while it is engaged in constructing the calorimeter. (Send any pictures to BSCS with the feedback for this activity.)

Hold up and display one of the setups with the test tube filled with water to the level of the masking tape, and say:

> NOW THAT WE HAVE CONSTRUCTED OUR CALORIMETERS, WE WILL BE BURNING FOOD ON THE WIRE GRATING WITH THE TEST TUBE OF WATER SITTING ABOVE THE FLAME.

Then ask:

> WHAT KIND OF ENERGY WILL BE GIVEN OFF WHEN WE BURN SOME FOOD IN OUR CALORIMETER?

> IF HEAT ENERGY IS GIVEN OFF FROM FOOD BURNING IN YOUR CALORIMETER, THEN WHERE WOULD THE HEAT GO?

> HOW COULD WE MEASURE HOW MUCH OF THE HEAT ENERGY GOES TO THE WATER IN THE TEST TUBE?

Stud

--co

--pr

--re

--su

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
2" length of string to the top of the eter.	
small piece of masking tape on the test from the bottom. This will mark the evel to be used when the food is burned.	--construct calorimeter.
he thermometer in the test tube. Make e string is hanging outside the can so does not catch fire while the food is .	
that the calorimeters are constructed ing assistance where necessary. You may take each team while it is engaged in constructing er. (Send any pictures to BSCS with the this activity.)	
isplay one of the setups with the test tube ater to the level of the masking tape, and say:	
WE HAVE CONSTRUCTED OUR CALORIMETERS, BE BURNING FOOD ON THE WIRE GRATING TEST TUBE OF WATER SITTING ABOVE THE	
D OF ENERGY WILL BE GIVEN OFF WHEN WE E FOOD IN OUR CALORIMETER?	--predict heat energy.
ENERGY IS GIVEN OFF FROM FOOD BURNING CALORIMETER, THEN WHERE WOULD THE HEAT	--respond, "Air," "Can," "Water," "Up."
D WE MEASURE HOW MUCH OF THE HEAT ENERGY THE WATER IN THE TEST TUBE?	--suggest using a thermometer.

MATERIALS

Slide 3-22

TEACHING STRATEGIES

Part II.

Project Slide 3-22 illustrating sugar and peanuts being burned.

Ask:

SUPPOSE WE WERE TO BURN A WHOLE BAG OF PEANUTS, (point) AND ONE TEASPOON OF SUGAR (point). WHICH WOULD GIVE OFF THE MOST ENERGY?

DOES THIS PROVE PEANUTS HAVE MORE ENERGY THAN THE SUGAR?

WHY NOT?

HOW COULD WE SHOW WHICH KIND OF FOOD DOES GIVE OFF THE MOST ENERGY, PEANUTS OR SUGAR?

If the desired response is not forthcoming, display the balance and ask:

HOW COULD WE USE THIS TO HELP US SEE WHICH KIND OF FOOD GIVES OFF THE MOST ENERGY?

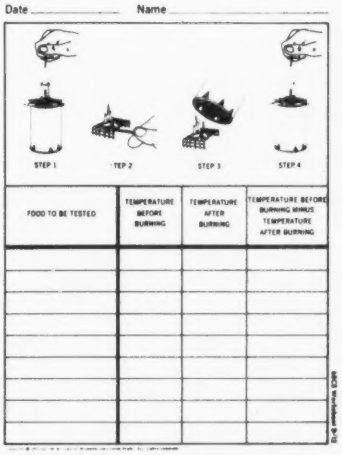
HOW COULD WE MAKE SURE WE HAVE EQUAL AMOUNTS OF FOOD BEFORE BURNING THEM?

HOW WOULD WE USE THE BALANCE AND WEIGHTS TO WEIGH EQUAL AMOUNTS OF FOOD?

Begin the experiment portion of the activity by saying:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
e 3-22 illustrating sugar and peanuts being	
WE WERE TO BURN A WHOLE BAG OF PEANUTS, AND ONE TEASPOON OF SUGAR (point). WHICH IVE OFF THE MOST ENERGY?	--predict, "Peanuts."
IS PROVE PEANUTS HAVE MORE ENERGY THAN THE	--respond, "No."
?	--indicate that there are more peanuts than sugar.
LD WE SHOW WHICH KIND OF FOOD DOES GIVE MOST ENERGY, PEANUTS OR SUGAR?	--suggest burning equal amounts of both foods.
the desired response is not forthcoming, splay the balance and ask:	
COULD WE USE THIS TO HELP US SEE WHICH ND OF FOOD GIVES OFF THE MOST ENERGY?	--recall weighing with the balance and suggest weighing out and then burning equal amounts of both foods.
COULD WE MAKE SURE WE HAVE EQUAL AMOUNTS FOOD BEFORE BURNING THEM?	--suggest weighing the food, using a balance.
WOULD WE USE THE BALANCE AND WEIGHTS TO GH EQUAL AMOUNTS OF FOOD?	--suggest putting a certain number of weights in one balance pan and adding food to the other until it balances.
eriment portion of the activity by saying:	

MATERIALS



Slide 3-23

Worksheet 3-13

TEACHING STRATEGIES

YOUR SUGGESTIONS FOR WEIGHING WERE GOOD, BUT SO THAT WE ARE ALL TESTING THE FOODS IN THE SAME WAY, LET'S USE THREE BEADS, OR WEIGHTS, AS THE AMOUNT THAT WE WILL USE EACH TIME.

Have the students weigh the foods they will burn by putting three beads, or weights, on one pan and balance that with a portion of each food they are to test. Instruct them to start with a larger amount of food and gradually remove small portions until the food balances the weight. If the foods will not be burned until the next day distribute beakers or other small containers to each team to put their weighed portion of food in.

Ask:

WHY DO WE NEED TO USE EQUAL AMOUNTS OF EACH FOOD?

Part III.

Pass out Worksheet 3-13 to students. Project Slide 3-23 of Worksheet 3-13 and explain how it is to be used. Points to be emphasized:

1. Write down the names of the foods to be tested.

2. Distribute a beaker of tap water to each group and an empty beaker in which to empty the heated water after each experiment.

3. Check and record the temperature of the water in the test tube before burning each food.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
GGESTIONS FOR WEIGHING WERE GOOD, BUT SO ARE ALL TESTING THE FOODS IN THE SAME T'S USE THREE BEADS, OR WEIGHTS, AS THE THAT WE WILL USE EACH TIME. dents weigh the foods they will burn by put- eads, or weights, on one pan and balance that on of each food they are to test. Instruct t with a larger amount of food and gradually portions until the food balances the weight. will not be burned until the next day eakers or other small containers to each their weighed portion of food in.	Students: --weigh equal portions of food.
WE NEED TO USE EQUAL AMOUNTS OF EACH	--recall slide of peanuts and sugar and respond, "In order to have a good test," "To get the right amounts of energy."
WORK TIME	
rksheet 3-13 to students. Project Slide 3-23 t 3-13 and explain how it is to be used. Points sized: down the names of the foods to be tested. ibute a beaker of tap water to each group n empty beaker in which to empty the heated after each experiment. and record the temperature of the water e test tube before burning each food.	

MATERIALS	TEACHING STRATEGIES
	Temperatures are to be recorded in degrees Fahrenheit. 4. Record the temperature of the water immediately after the food is burned (as much as it can be). Sometimes the flames may go out prematurely. The food needs to be reignited in such cases. 5. Calculate the change of temperature by subtracting the starting temperature from the temperature after burning. This can be done after each test or after all tests are completed. Demonstrate the procedure for using the calorimeter by giving the following directions for burning foods to the students while actually carrying them out yourself. 1. LAY DOWN A SHEET OF ALUMINUM FOIL AND SET THE WIRE GRATING IN THE MIDDLE. 2. FILL THE TEST TUBE WITH 3 INCHES OF WATER (to the tape line). INSERT THE THERMOMETER INTO THE TEST TUBE. PLACE THE TEST TUBE IN POSITION ON THE CAN AND HAVE THE CAN AND TEST TUBE SITTING TO ONE SIDE READY TO PLACE OVER THE BURNING FOOD. 3. PLACE THE WEIGHED PORTION OF FOOD TO BE TESTED IN A SMALL PILE ON THE CENTER OF THE GRATING. 4. LIGHT THE FOOD BY HOLDING A BURNING MATCH UNDER THE FOOD ON THE GRATE. Since some of the foods are at first difficult to ignite, it is recommended that long fireplace matches be used. 5. WHEN THE FOOD HAS BEGUN TO BURN ON ITS OWN, CAREFULLY PLACE THE CALORIMETER OVER THE GRATING SO THAT THE TEST TUBE IS DIRECTLY ABOVE THE BURNING FOOD.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
eratures are to be recorded in degrees enheit. rd the temperature of the water immediately the food is burned (as much as it can be). times the flames may go out prematurely. The needs to be reignited in such cases. ulate the change of temperature by subtracting starting temperature from the temperature after ing. This can be done after each test or after tests are completed. e the procedure for using the calorimeter by following directions for burning foods to s while actually carrying them out yourself. AY DOWN A SHEET OF ALUMINUM FOIL AND SET THE RE GRATING IN THE MIDDLE. ILL THE TEST TUBE WITH 3 INCHES OF WATER (to e tape line). INSERT THE THERMOMETER INTO E TEST TUBE. PLACE THE TEST TUBE IN POSITION THE CAN AND HAVE THE CAN AND TEST TUBE TTING TO ONE SIDE READY TO PLACE OVER THE RNING FOOD. ACE THE WEIGHED PORTION OF FOOD TO BE TESTED A SMALL PILE ON THE CENTER OF THE GRATING. GHT THE FOOD BY HOLDING A BURNING MATCH DER THE FOOD ON THE GRATE. of the foods are at first difficult to ignite, mended that long fireplace matches be used. EN THE FOOD HAS BEGUN TO BURN ON ITS OWN, REFULLY PLACE THE CALORIMETER OVER THE ATING SO THAT THE TEST TUBE IS DIRECTLY OVE THE BURNING FOOD.	

MATERIALS

TEACHING STRATEGIES

6. ALLOW THE FOOD TO BURN AS COMPLETELY AS POSSIBLE. IT MAY BE NECESSARY TO REMOVE THE CALORIMETER BRIEFLY TO RELIGHT THE FOOD.

7. USING THE STRING, REMOVE THE THERMOMETER AND QUICKLY READ THE TEMPERATURE AND RECORD IT ON THE WORKSHEET.

Instruct students that the procedure is the same for other foods. Remind students to start each test with a new supply of tap water. Be sure to fill the tube to tape mark to insure that an equal amount of water is used for each test.

Stress the importance of taking and recording the temperature of the water at the beginning of each test.

Now allow them to begin testing foods. Be prepared to give help to each team when necessary. You may photograph students while they are engaged in testing the foods. (Send any photos to the BSCS office with your feedback forms for this activity. Don't forget to label photos.)

As teams finish testing a particular food, encourage students to discuss and compare their data and try to account for any apparent differences. Such things as differing amounts of food, different beginning temperatures, and having the flame go out and have to be reignited may be factors causing variation. Students will need help in finding the amount of temperature change. It is this information that should be compared.

Part IV.

After the data has been collected and discussed, ask:

> IF YOU WANTED A FOOD THAT WOULD SUPPLY A LOT OF ENERGY, OR "GO POWER," WHICH OF THE FOODS YOU BURNED WOULD YOU CHOOSE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
LOW THE FOOD TO BURN AS COMPLETELY AS POSSIBLE. MAY BE NECESSARY TO REMOVE THE CALORIMETER EFLY TO RELIGHT THE FOOD.	
NG THE STRING, REMOVE THE THERMOMETER AND CKLY READ THE TEMPERATURE AND RECORD IT ON WORKSHEET.	
dents that the procedure is the same for other nd students to start each test with a new p water. Be sure to fill the tube to tape re that an equal amount of water is used for	
mportance of taking and recording the of the water at the beginning of each	
em to begin testing foods. Be prepared to each team when necessary. You may photograph le they are engaged in testing the foods. otos to the BSCS office with your feedback is activity. Don't forget to label photos.)	--engage in food testing process.
ish testing a particular food, encourage discuss and compare their data and try to any apparent differences. Such things as ounts of food, different beginning tempera- aving the flame go out and have to be reignited rs causing variation. Students will need help he amount of temperature change. It is this that should be compared.	
ta has been collected and discussed, ask:	
WANTED A FOOD THAT WOULD SUPPLY A LOT OF OR "GO POWER," WHICH OF THE FOODS YOU WOULD YOU CHOOSE?	--choose the one which had caused the greatest temperature changes.

MATERIALS	TEACHING STRATEGIES
	WHAT IN THE EXPERIMENT MADE YOU THINK (food chosen) HAS THE MOST "GO POWER"? CAN ANYONE TELL ME WHAT WORD WE USE TO DESCRIBE THE AMOUNT OF ENERGY IN FOODS? Students may or may not be familiar with the term "calorie." While they have probably heard the term associated with food, it is unlikely that they understand the word's meaning. If the students do not suggest the word calorie, ask: HAVE ANY OF YOU EVER BEEN ON A DIET? OR KNOW SOMEONE WHO IS ON ONE? WHAT DOES A PERSON ON A DIET HAVE TO COUNT CAREFULLY? Then say: THE TERM "CALORIE" IS USED TO DESCRIBE THE AMOUNT OF ENERGY IN FOODS. Write "calorie" on the board. Distribute calorie booklets and say: SCIENTISTS USED CALORIMETERS THAT ARE FANCIER AND MORE ACCURATE THAN OURS TO MEASURE THE AMOUNT OF HEAT ENERGY GIVEN OFF WHEN FOOD IS BURNED. THIS HEAT ENERGY, OR THE NUMBER OF CALORIES IS LISTED IN THE BOOK THAT WAS JUST GIVEN TO YOU. WE CAN USE THIS BOOK TO LOOK UP THE NUMBER OF CALORIES IN MOST OF THE FOODS THAT WE EAT.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
IN THE EXPERIMENT MADE YOU THINK (food chosen) HE MOST "GO POWER"?	Students:
NYONE TELL ME WHAT WORD WE USE TO DESCRIBE MOUNT OF ENERGY IN FOODS?	--associate a greater temperature change with a greater release of stored energy.
ay or may not be familiar with the term While they have probably heard the term with food, it is unlikely that they understand meaning.	--may or may not respond, "Calorie."
If the students do not suggest the word calorie, ask:	
HAVE ANY OF YOU EVER BEEN ON A DIET? OR KNOW SOMEONE WHO IS ON ONE?	--indicate knowing a friend or relative who has dieted.
WHAT DOES A PERSON ON A DIET HAVE TO COUNT CAREFULLY?	--respond, "Calories."
ERM "CALORIE" IS USED TO DESCRIBE THE AMOUNT ERGY IN FOODS.	
orie" on the board.	
calorie booklets and say:	
TISTS USED CALORIMETERS THAT ARE FANCIER AND ACCURATE THAN OURS TO MEASURE THE AMOUNT OF ENERGY GIVEN OFF WHEN FOOD IS BURNED. THIS ENERGY, OR THE NUMBER OF CALORIES IS LISTED E BOOK THAT WAS JUST GIVEN TO YOU. WE CAN HIS BOOK TO LOOK UP THE NUMBER OF CALORIES ST OF THE FOODS THAT WE EAT.	

ACTIVITY 3-12

MATERIALS

TEACHING STRATEGIES

After students have had ample time to page through and examine the book, say:

> LET'S NOW LOOK UP THE NUMBER OF CALORIES IN ONE OF THE FOODS THAT WE BURNED. FIRST, HOW MANY CALORIES ARE IN WALNUTS?

Write the word "walnuts" on the board and assist the students in locating the number of calories. Write it on the chalkboard also.

Have the students suggest other foods the class can look up and add these to the list on the board.

Remind students that the number of calories refers to a certain portion of that food, usually the amount in one serving that we would eat.

Conclude by asking:

> CALORIES REFER TO THE AMOUNT OF ENERGY IN FOODS. DO ALL OF THE FOODS WE EAT CONTAIN THE SAME AMOUNT OF ENERGY?

Collect Worksheet 3-13 and tabulate the information on Tallysheet 3-6.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
dents have had ample time to page through and he book, say: S NOW LOOK UP THE NUMBER OF CALORIES IN OF THE FOODS THAT WE BURNED. FIRST, HOW CALORIES ARE IN WALNUTS?	
word "walnuts" on the board and assist the in locating the number of calories. Write it on board also.	--look up the word walnut and the amount of calories walnuts contain.
students suggest other foods the class can look d these to the list on the board.	--look up suggested foods.
udents that the number of calories refers to a ortion of that food, usually the amount in one hat we would eat. by asking: RIES REFER TO THE AMOUNT OF ENERGY IN FOODS. LL OF THE FOODS WE EAT CONTAIN THE SAME AMOUNT NERGY?	--recall the experiment with the calorimeter and infer that different foods have different amounts of energy.
orksheet 3-13 and tabulate the information on t 3-6.	

Teacher _____

Date _____

UNIT III, CORE B
TALLYSHEET 3-6: Tabulation of Data on Worksheet 3-13
ACTIVITY 3-12: "Measuring Energy Values"

Column 1 (Team). Indicate which students worked together by circling 1 for members of one group, 2 for all members on the next, etc. When tallysheet is completed, the results by team should be identical. If not, some students need extra help in working with a group, recording data, etc.

Column 2 (Completed Worksheet). Some students may not have understood the experiment or had problems. Explore and provide further opportunities to succeed with this activity.

Column 3 (Subtraction). This tally will indicate the amount of difficulty your class had with subtraction. If substantial, further discussion of corrected results may be needed.

Column 4 (Amount of Change). Write in the number of degrees of change for each food listed. Were differences minimal? Were students finding the same relative order of energy levels for food (i.e., walnuts have most, bacon least, etc.)? If not, then their results are not comparable. Some teams may need to repeat tests of some foods.

		1 Team	2 Completed Worksheet		3 Subtraction		4 Amount of change found for -			
	KEY:	1 2 3 4 5 6 7 8	yes	no	ok	error	walnuts	bacon	potato chips	marshmallows
Attach ID list here.	01	1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				

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		1 Team	2 Completed Worksheet		3 Subtraction		4 Amount of change found for -			
	KEY:	1 2 3 4 5 6 7 8	yes	no	ok	error	walnuts	bacon	potato chips	marshmallows
Attach ID list here.	01	1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
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		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				
		1 2 3 4 5 6 7 8	yes	no	ok	error				

UNIT III, CORE B
ACTIVITY 3-12: "Measuring Energy Values"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised?
Page(s) _____:

17. Did any students encounter difficulty building the calorimeter?
☐ No ☐ Yes: Comment.

18. Did students have difficulty
--burning foods? ☐ No ☐ Yes: Comment.

--reading and recording temperature? ☐ No ☐ Yes: Comment.

--finding the change in temperature? ☐ No ☐ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B

ACTIVITY 3-12: "Measuring Energy Values"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.

3. Determine that different foods have different amounts of energy.

5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

MATERIALS

TEACHING STRATEGIES

Activity 3-13. A Winner Is "Full And Healthy"

It has been established in the previous activity that different foods give off different amounts of heat (energy) when burned. The students have learned that the scientific term applied to the unit of energy is the calorie. In order to avoid the student's wrongly associating high caloric content with the value of a food, it is necessary to introduce for some, and reinforce for others, the concept of a balanced diet. Playing the Full and Healthy *game provides the student with the opportunity to select food from the four basic food groups. It will become apparent from the game that the criteria for a healthful diet includes more than calories.*

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

B OBJECTIVES:

1. Recognize that food is our main source of energy.

3. Determine that different foods have different amounts of energy.

5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

ACTIVITY 3-13. A WINNER IS "FULL AND HEALTHY"

BSCS

TEACHING STRATEGIES

-13. A Winner Is "Full And Healthy"

n established in the previous activity that foods give off different amounts of heat hen burned. The students have learned that ific term applied to the unit of energy is e. In order to avoid the student's wrongly g high caloric content with the value of is necessary to introduce for some, and for others, the concept of a balanced diet. e Full and Healthy game provides the student pportunity to select food from the four basic s. It will become apparent from the game that ia for a healthful diet includes more than

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

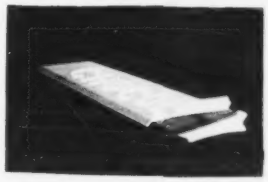
--have played both variations of the Full and Healthy game.
--have felt successful and enjoyed the game.
--have recorded on the score sheet (Worksheet 3-14) what food group requirements he has satisfied.
--have identified the four basic food groups and how many servings he should eat each day from each group.
--have recognized that to fulfill food group requirements is more important than what individual meals themselves consist of.
--have recognized that a healthful diet consists of more than just calories.

ACTIVITY 3-13

MATERIALS

Deck of *Full and Healthy* cards per group of four students
1 Chart of four food groups
Book, *Calorie Counter*
Slide 3-24
Slide 3-25
Worksheet 3-14
Slide 3-26
*35mm Slide projector
Worksheet 3-15
Slide 3-27

Slide 3-24



*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

Select a place to display the food group chart. Do not, however, present the chart to the students until the appropriate time in the teaching strategy.

Begin the activity by reviewing what a calorie is as developed in Activity 3-12. Say:

> IN OUR LAST ACTIVITY WE OBSERVED TEMPERATURE CHANGES WHEN DIFFERENT FOODS WERE BURNED. WE LEARNED THAT WHEN SPEAKING OF THESE DIFFERENCES, FOOD SCIENTISTS USE THE TERM CALORIE.

Then ask:

> WHO CAN REMEMBER AND CAN TELL THE CLASS WHAT A CALORIE IS?

Project Slide 3-24 showing a chocolate bar and ask:

> DOES THIS CHOCOLATE BAR HAVE LOTS OF CALORIES, OR ENERGY?

Whether or not students recognize that chocolate bars are high in energy, ask:

> WHAT COULD WE DO TO FIND OUT HOW MANY CALORIES ARE IN A CHOCOLATE BAR?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
paration:	
ace to display the food group chart. Do not, esent the chart to the students until the time in the teaching strategy.	
ctivity by reviewing what a calorie is as n Activity 3-12. Say:	
LAST ACTIVITY WE OBSERVED TEMPERATURE S WHEN DIFFERENT FOODS WERE BURNED. WE D THAT WHEN SPEAKING OF THESE DIFFERENCES, CIENTISTS USE THE TERM CALORIE.	
N REMEMBER AND CAN TELL THE CLASS WHAT RIE IS?	--recall that a calorie refers to the amount of energy in food.
de 3-24 showing a chocolate bar and ask:	
HIS CHOCOLATE BAR HAVE LOTS OF CALORIES, RGY?	--may or may not respond by indicating candy bars are high in calories (energy).
not students recognize that chocolate bars are rgy, ask:	
OULD WE DO TO FIND OUT HOW MANY CALORIES A CHOCOLATE BAR?	--suggest burning in a calorimeter; some may want to look this information up in the calorie book.

MATERIALS

Slide 3-25

TEACHING STRATEGIES

If some suggest burning but not checking the calorie book, say:

CHOCOLATE IS ONE OF THE FOODS THAT WILL NOT BURN PROPERLY IN OUR CALORIMETER. FOOD SCIENTISTS HAVE BEEN ABLE TO BURN IT WITH THE SPECIAL CALORIMETERS THEY USE AND HAVE FIGURED OUT HOW MANY CALORIES A CHOCOLATE BAR HAS. WHERE COULD WE LOOK TO FIND OUT SUCH INFORMATION?

Select a student to look up "chocolate bar" and tell the class the number of calories (250). Write on the chalkboard:

"Chocolate Bar = 250 calories"

Project Slide 3-25 of teenager sitting at a table on which is a plate full of chocolate bars.

Ask:

DO YOU THINK A PERSON WOULD BE A HEALTHY PERSON IF HE ATE A MEAL LIKE THIS?

WHY WOULDN'T THIS MEAL MAKE HIM HEALTHY? IT HAS LOTS OF CALORIES AND ENERGY.

Now ask:

WHEN YOU EAT OR PLAN A MEAL, WHAT SHOULD YOU THINK ABOUT BESIDES JUST ENERGY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
If some suggest burning but not checking the calorie book, say:	
CHOCOLATE IS ONE OF THE FOODS THAT WILL NOT BURN PROPERLY IN OUR CALORIMETER. FOOD SCIENTISTS HAVE BEEN ABLE TO BURN IT WITH THE SPECIAL CALORIMETERS THEY USE AND HAVE FIGURED OUT HOW MANY CALORIES A CHOCOLATE BAR HAS. WHERE COULD WE LOOK TO FIND OUT SUCH INFORMATION?	--recall the calorie book and suggest looking up the information there.
tudent to look up "chocolate bar" and tell the number of calories (250). Write on the :	
olate Bar = 250 calories"	
ide 3-25 of teenager sitting at a table on which full of chocolate bars.	
U THINK A PERSON WOULD BE A HEALTHY N IF HE ATE A MEAL LIKE THIS?	--recall what they have heard or learned previously and respond, "No."
OULDN'T THIS MEAL MAKE HIM HEALTHY? IT OTS OF CALORIES AND ENERGY.	--respond with comments such as, "Too much candy isn't good for you," "You'll get fat," "You'll get pimples," "No vitamins," etc.
YOU EAT OR PLAN A MEAL, WHAT SHOULD YOU ABOUT BESIDES JUST ENERGY?	--respond by naming a variety of foods, or vitamins, minerals, etc.

ACTIVITY 3-13

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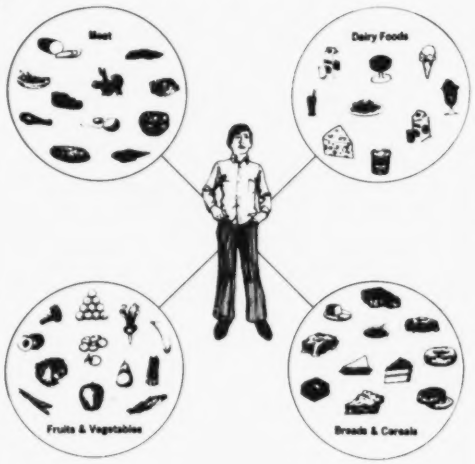
MATERIALS

Diagram 3-8



TEACHING STRATEGIES

Display the food group chart (refer to Diagram 3-8) and say:

> TO STAY HEALTHY, WE NEED TO EAT SEVERAL DIFFERENT KINDS OF FOOD EACH DAY, FOOD SCIENTISTS HAVE FOUND. THE FOODS WE EAT HAVE BEEN DIVIDED INTO FOUR GROUPS.

Point to the MEAT group on the chart and say:

> THESE FOODS GIVE US ENERGY PLUS LOTS OF PROTEIN. (Write protein on the chalkboard.) YOU CAN SEE THIS GROUP INCLUDES MEAT, BUT THERE ARE ALSO THINGS RICH IN PROTEIN THAT COULD BE SUBSTITUTED FOR MEAT. THIS GROUP IS IMPORTANT BECAUSE IT HELPS US BUILD AND REPAIR DIFFERENT THINGS IN OUR BODIES, LIKE MUSCLES AND SKIN.

Have one or several students come to the chart and name the various foods pictured in the meat group.

Now say:

> TO BE HEALTHY WE NEED TO EAT AT LEAST TWO SERVINGS EACH DAY OF THE FOODS IN THIS GROUP. DOES ANYONE KNOW HOW MUCH A SERVING IS?
>
> A SERVING IS THE AMOUNT OF ANY FOOD MOST PEOPLE WOULD EAT DURING ONE MEAL.

Point to the MILK group and say:

> THIS GROUP IS IMPORTANT BECAUSE IT GIVES US ENERGY AND HELPS OUR BODY TO GROW STRONG BONES AND TEETH. IN THIS GROUP YOU CAN SEE MILK AND FOODS MADE FROM MILK.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
e food group chart (refer to Diagram 3-8) and	Students:
AY HEALTHY, WE NEED TO EAT SEVERAL DIFFERENT OF FOOD EACH DAY, FOOD SCIENTISTS HAVE . THE FOODS WE EAT HAVE BEEN DIVIDED FOUR GROUPS.	
he MEAT group on the chart and say:	
FOODS GIVE US ENERGY PLUS LOTS OF IN. (Write protein on the chalkboard.) AN SEE THIS GROUP INCLUDES MEAT, BUT ARE ALSO THINGS RICH IN PROTEIN THAT BE SUBSTITUTED FOR MEAT. THIS GROUP PORTANT BECAUSE IT HELPS US BUILD EPAIR DIFFERENT THINGS IN OUR BODIES, MUSCLES AND SKIN.	
r several students come to the chart and name s foods pictured in the meat group.	--come to the chart and identify foods.
HEALTHY WE NEED TO EAT AT LEAST TWO NGS EACH DAY OF THE FOODS IN THIS GROUP. ANYONE KNOW HOW MUCH A SERVING IS?	--suggest, "Enough for just one meal," "Just a little," "Enough to fill you up."
VING IS THE AMOUNT OF ANY FOOD MOST E WOULD EAT DURING ONE MEAL.	
he MILK group and say:	
GROUP IS IMPORTANT BECAUSE IT GIVES US Y AND HELPS OUR BODY TO GROW STRONG AND TEETH. IN THIS GROUP YOU CAN SEE AND FOODS MADE FROM MILK.	

MATERIALS	TEACHING STRATEGIES
	(Student's name), WOULD YOU COME TO THE CHART AND NAME WHAT IS IN THIS GROUP? FROM THIS GROUP WE SHOULD ALSO EAT TWO SERVINGS EACH DAY. Point to the FRUIT-VEGETABLE group and say: FRUITS AND VEGETABLES ARE IMPORTANT BECAUSE THEY CONTAIN VITAMINS AND MINERALS NOT IN THE MEAT OR MILK GROUP THAT WE NEED TO STAY HEALTHY, AND THEY HELP US DIGEST ALL OUR FOOD. THERE IS SOME ENERGY IN FRUITS AND VEGETABLES, TOO. (Student's name), NAME THE FOODS IN THIS GROUP PLEASE. If students ask about vitamins and minerals, explain that while they are sometimes referred to as food they do not give us energy. They are, however, substances found in small amounts in the food we eat which help our bodies work properly. Then say: EACH OF US SHOULD EAT FOUR SERVINGS OF FOODS FROM THIS GROUP EACH DAY. Point to the BREAD AND CEREAL group and say: THIS LAST GROUP ALSO SUPPLIES US WITH CERTAIN VITAMINS AND MINERALS, BUT MOSTLY THESE FOODS ARE EATEN BECAUSE THEY GIVE US ENERGY. (Student's name), NAME THE FOODS IN THIS GROUP PLEASE.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
dent's name), WOULD YOU COME TO THE T AND NAME WHAT IS IN THIS GROUP?	--name foods in milk group.
THIS GROUP WE SHOULD ALSO EAT TWO INGS EACH DAY.	
the FRUIT-VEGETABLE group and say:	
TS AND VEGETABLES ARE IMPORTANT BECAUSE CONTAIN VITAMINS AND MINERALS NOT IN MEAT OR MILK GROUP THAT WE NEED TO HEALTHY, AND THEY HELP US DIGEST ALL FOOD. THERE IS SOME ENERGY IN FRUITS VEGETABLES, TOO.	
dent's name), NAME THE FOODS IN THIS P PLEASE.	--name foods in fruit and vegetable groups.
ts ask about vitamins and minerals, explain that y are sometimes referred to as food they do not nergy. They are, however, substances found in unts in the food we eat which help our bodies erly.	
OF US SHOULD EAT FOUR SERVINGS OF FOODS THIS GROUP EACH DAY.	
the BREAD AND CEREAL group and say:	
LAST GROUP ALSO SUPPLIES US WITH CERTAIN MINS AND MINERALS, BUT MOSTLY THESE FOODS EATEN BECAUSE THEY GIVE US ENERGY.	
dent's name), NAME THE FOODS IN THIS GROUP SE.	--name the foods pictured in the bread and cereal group.

MATERIALS

Slide 3-26

Worksheet 3-14

TEACHING STRATEGIES

Then say:

> EACH OF US SHOULD ALSO EAT FOUR SERVINGS OF FOODS FROM THIS GROUP EACH DAY.

It should be emphasized that all four food groups supply energy, but that each group supplies additional ingredients that are essential to health.

Now say:

> THERE ARE A NUMBER OF FOODS THAT WE EAT THAT ARE HIGH IN ENERGY BUT HAVE LITTLE OR NO HEALTH VALUE. WE WILL CALL THIS GROUP THE "X-RATED" GROUP.
>
> WHAT FOODS DO YOU THINK MIGHT BELONG IN THE X-RATED GROUP?

Now say:

> TO BE FULL AND HEALTHY EACH DAY YOU NEED AT LEAST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES, TWO SERVINGS OF MILK OR MILK PRODUCTS, FOUR SERVINGS OF FRUITS AND VEGETABLES, AND FOUR OF BREADS AND CEREALS. IF YOU CHOOSE THE RIGHT KINDS OF FOODS IN THE RIGHT AMOUNTS, YOU CAN BE A WINNER IN THE *FULL AND HEALTHY* GAME. LET'S TAKE SOME TIME NOW TO PLAY THIS GAME.

Divide the class into groups of three or four and distribute a deck of *Full and Healthy* cards to each group. Every player should also receive a score sheet, Worksheet 3-14.

Project Slide 3-26 of Worksheet 3-14 and say:

> THE PURPOSE OF THIS GAME, AS THE NAME SAYS, IS TO EAT SO THAT YOU ARE FULL AND HEALTHY. ON THE CARDS THAT YOU HAVE ARE FOODS THAT YOU MIGHT

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
y:	Students:
CH OF US SHOULD ALSO EAT FOUR SERVINGS OF ODS FROM THIS GROUP EACH DAY.	
ld be emphasized that all four food groups supply but that each group supplies additional ents that are essential to health.	
:	
ERE ARE A NUMBER OF FOODS THAT WE EAT THAT E HIGH IN ENERGY BUT HAVE LITTLE OR NO ALTH VALUE. WE WILL CALL THIS GROUP THE -RATED" GROUP.	
AT FOODS DO YOU THINK MIGHT BELONG IN THE RATED GROUP?	--suggest, "Candy," "Pop," "Chips," etc.
:	
BE FULL AND HEALTHY EACH DAY YOU NEED AT AST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES, O SERVINGS OF MILK OR MILK PRODUCTS, FOUR RVINGS OF FRUITS AND VEGETABLES, AND FOUR BREADS AND CEREALS. IF YOU CHOOSE THE RIGHT NDS OF FOODS IN THE RIGHT AMOUNTS, YOU CAN A WINNER IN THE *FULL AND HEALTHY* GAME. T'S TAKE SOME TIME NOW TO PLAY THIS GAME.	
the class into groups of three or four and ute a deck of *Full and Healthy* cards to each Every player should also receive a score sheet, et 3-14.	--divide into groups.
Slide 3-26 of Worksheet 3-14 and say:	
E PURPOSE OF THIS GAME, AS THE NAME SAYS, IS EAT SO THAT YOU ARE FULL AND HEALTHY. ON THE RDS THAT YOU HAVE ARE FOODS THAT YOU MIGHT	

MATERIALS	TEACHING STRATEGIES
	EAT. THE WINNER OF THIS GAME IS THE FIRST PERSON TO MAKE THREE MEALS THAT INCLUDE TWO FOODS WHICH ARE MEAT OR MEAT SUBSTITUTES, TWO THAT ARE MILK OR MILK PRODUCTS, FOUR WHICH ARE FRUITS OR VEGETABLES, AND FOUR WHICH ARE BREAD OR CEREALS. THIS PERSON WILL BE THE "FULL AND HEALTHY" PERSON. Before giving any further instructions have each group spread the cards out on their playing surfaces to become familiar with the pictures (foods) that comprise the playing decks. Say: THIS GAME IS SIMILAR TO RUMMY. I WILL EXPLAIN THE RULES AND THEN PLAY THE GAME WITH TWO OF YOU TO SHOW THE REST OF THE CLASS HOW IT SHOULD BE PLAYED. THEN WE WILL ALL PLAY THE GAME. 1. AFTER THE CARDS ARE SHUFFLED, EACH PLAYER WILL BE DEALT FIVE CARDS TO START WITH. 2. THE REST OF THE CARDS ARE PLACED FACEDOWN IN THE MIDDLE OF THE TABLE AND THE TOP CARD ON THAT PILE IS TURNED FACEUP BESIDE THE OTHERS. 3. EACH PLAYER LOOKS AT THE CARDS IN HIS HAND TO SEE IF ANY OF HIS CARDS COULD MAKE A MEAL. (Any combination of foods that the player might consider acceptable to eat at one sitting.) 4. THE PLAYER TO THE LEFT OF THE DEALER PLAYS FIRST. IF HE HAS A "MEAL" OF CARDS IN HIS HAND, HE MAY LAY THE GROUP FACEUP ON THE TABLE, DECLARING WHAT FOODS ARE ON THE CARDS AS HE DOES SO.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
THE WINNER OF THIS GAME IS THE FIRST N TO MAKE THREE MEALS THAT INCLUDE TWO WHICH ARE MEAT OR MEAT SUBSTITUTES, HAT ARE MILK OR MILK PRODUCTS, FOUR ARE FRUITS OR VEGETABLES, AND FOUR ARE BREAD OR CEREALS. THIS PERSON BE THE "FULL AND HEALTHY" PERSON.	Students:
ing any further instructions have each group cards out on their playing surfaces to become ith the pictures (foods) that comprise the cks.	--examine cards.
GAME IS SIMILAR TO RUMMY. I WILL EXPLAIN ULES AND THEN PLAY THE GAME WITH TWO OF O SHOW THE REST OF THE CLASS HOW IT SHOULD AYED. THEN WE WILL ALL PLAY THE GAME.	
FTER THE CARDS ARE SHUFFLED, EACH PLAYER ILL BE DEALT FIVE CARDS TO START WITH.	
HE REST OF THE CARDS ARE PLACED FACEDOWN N THE MIDDLE OF THE TABLE AND THE TOP ARD ON THAT PILE IS TURNED FACEUP ESIDE THE OTHERS.	
ACH PLAYER LOOKS AT THE CARDS IN HIS HAND O SEE IF ANY OF HIS CARDS COULD MAKE A MEAL. Any combination of foods that the player ight consider acceptable to eat at one itting.)	
HE PLAYER TO THE LEFT OF THE DEALER PLAYS IRST. IF HE HAS A "MEAL" OF CARDS IN HIS AND, HE MAY LAY THE GROUP FACEUP ON THE ABLE, DECLARING WHAT FOODS ARE ON THE CARDS S HE DOES SO.	

MATERIALS	TEACHING STRATEGIES
	5. HE THEN PICKS FROM THE FACEDOWN PILE THE NUMBER OF CARDS HE JUST PUT DOWN. AFTER RESTORING HIS HAND TO FIVE CARDS HE DRAWS THE TOP CARD FROM THE DECK OR TAKES THE CARD THAT IS FACEUP ON THE DECK. HE MUST THEN DISCARD ONE CARD FROM HIS HAND SO THAT THE NUMBER OF CARDS HELD ALWAYS REMAINS AT FIVE. IT IS PLACED ON THE FACEUP PILE. 6. AFTER A PLAYER LAYS A "MEAL" DOWN ON THE TABLE, HE WILL PLACE A MARK ON HIS SCORE SHEET INDICATING THE FOOD GROUPS EATEN IN THAT MEAL. 7. EACH PLAYER TAKES HIS TURN. CARDS DRAWN ARE USED TO FORM NEW MEALS. REMEMBER TO DRAW THE SAME NUMBER OF CARDS AS WERE LAID DOWN (See Rule 5). 8. ANY CARDS FROM THE "X" GROUP MAY BE USED AS PART OF A MEAL, BUT WILL NOT COUNT AS FULFILLING THE DAILY REQUIREMENTS OF ANY FOOD GROUP. 9. IF A "WILD" CARD IS DRAWN, A PLAYER MAY USE IT FOR ANY FOOD OR FOOD GROUP HE WISHES, BUT MUST INDICATE WHAT IT IS WHEN HE LAYS IT DOWN. 10. ONLY THREE MEALS MAY BE LAID DOWN DURING THE GAME BY ANY ONE PERSON. 11. THE FIRST PERSON TO HAVE THREE MEALS IN FRONT OF HIM WHICH INCLUDE TWO FOODS FROM THE MEAT GROUP, TWO FOODS FROM THE MILK GROUP, FOUR FOODS FROM THE FRUIT AND VEGETABLE GROUP, AND FOUR FOODS FROM THE BREAD AND CEREAL GROUP WILL HAVE HAD ALL THE REQUIRED FOODS FOR A NUTRITIOUS DAILY DIET AND BE "FULL AND HEALTHY," WINNING THE GAME.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
HEN PICKS FROM THE FACEDOWN PILE THE ER OF CARDS HE JUST PUT DOWN. AFTER ORING HIS HAND TO FIVE CARDS HE DRAWS THE CARD FROM THE DECK OR TAKES THE CARD IS FACEUP ON THE DECK. HE MUST THEN ARD ONE CARD FROM HIS HAND SO THAT THE ER OF CARDS HELD ALWAYS REMAINS AT FIVE. S PLACED ON THE FACEUP PILE. R A PLAYER LAYS A "MEAL" DOWN ON THE E, HE WILL PLACE A MARK ON HIS SCORE T INDICATING THE FOOD GROUPS EATEN IN MEAL. PLAYER TAKES HIS TURN. CARDS DRAWN USED TO FORM NEW MEALS. REMEMBER TO THE SAME NUMBER OF CARDS AS WERE DOWN (See Rule 5). CARDS FROM THE "X" GROUP MAY BE USED AS OF A MEAL, BUT WILL NOT COUNT AS FULFILLING DAILY REQUIREMENTS OF ANY FOOD GROUP. "WILD" CARD IS DRAWN, A PLAYER MAY USE OR ANY FOOD OR FOOD GROUP HE WISHES, MUST INDICATE WHAT IT IS WHEN HE LAYS OWN. THREE MEALS MAY BE LAID DOWN DURING THE BY ANY ONE PERSON. FIRST PERSON TO HAVE THREE MEALS IN FRONT IM WHICH INCLUDE TWO FOODS FROM THE MEAT P, TWO FOODS FROM THE MILK GROUP, FOUR S FROM THE FRUIT AND VEGETABLE GROUP, AND FOODS FROM THE BREAD AND CEREAL GROUP WILL HAD ALL THE REQUIRED FOODS FOR A NUTRITIOUS DIET AND BE "FULL AND HEALTHY," WINNING AME.	

MATERIALS	TEACHING STRATEGIES
	The student should keep track of what food groups he has and how many he has on his score sheet. This will help him to keep track of what he still needs in order to win. 12. PLAYERS MAY LAY DOWN "MEALS" ONLY DURING THEIR TURNS. 13. ONCE A PLAYER HAS LAID DOWN A MEAL, HE MAY ADD TO THAT MEAL WHEN IT IS HIS TURN AND WHEN HE HAS ANOTHER CARD THAT MIGHT FIT INTO THAT MEAL. 14. TO KEEP TRACK OF THE GAMES EACH PLAYER WINS, HE SHOULD CIRCLE EACH DAY OF THE WEEK HE IS THE FULL AND HEALTHY PERSON. Now select two or three students and go over the rules again, demonstrating how the game is played. Show students an example of each of the food group cards, an "X" card, and a "wild" card. Continue the demonstration only until the game is understood. Then allow the students to play the game as long as it seems appropriate. Following the game choose one student and ask: WOULD YOU DESCRIBE ONE OF THE MEALS THAT YOU LAID DOWN?

GAME | TIM

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
should keep track of what food groups he has y he has on his score sheet. This will help track of what he still needs in order to win. LAYERS MAY LAY DOWN "MEALS" ONLY DURING HEIR TURNS. NCE A PLAYER HAS LAID DOWN A MEAL, HE MAY DD TO THAT MEAL WHEN IT IS HIS TURN AND HEN HE HAS ANOTHER CARD THAT MIGHT FIT NTO THAT MEAL. O KEEP TRACK OF THE GAMES EACH PLAYER WINS, E SHOULD CIRCLE EACH DAY OF THE WEEK HE S THE FULL AND HEALTHY PERSON. wo or three students and go over the rules nstrating how the game is played. Show students of each of the food group cards, an "X" card, " card. Continue the demonstration only until understood. Then allow the students to play long as it seems appropriate.	--observe two or three classmates and the teacher playing the game. --demonstrate ability to play the game following the rules described.
GAME TIME	
he game choose one student and ask: OU DESCRIBE ONE OF THE MEALS THAT D DOWN?	--respond by listing the foods in his meal.

MATERIALS

TEACHING STRATEGIES

Ask the class:

IS THIS THE KIND OF MEAL WE USUALLY EAT?

It is likely that the meals students lay down in the game will not necessarily be standard meals. This discussion is to establish the notion that a meal does not have to consist of the usual meat, vegetable, and salad -- or whatever -- the student may normally eat.

What is important is that as long as the required number of servings from each food group is satisfied, the makeup of the meals becomes a personal preference.

Continue by saying:

EVEN THOUGH THIS IS NOT THE USUAL KIND OF MEAL WE EAT, IS IT A NUTRITIOUS MEAL?

REMEMBER, TO BE FULL AND HEALTHY EACH DAY YOU NEED AT LEAST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES, TWO SERVINGS OF MILK OR MILK PRODUCTS, FOUR SERVINGS OF FRUITS AND VEGETABLES, AND FOUR OF BREADS AND CEREALS.

Then ask:

WHICH IS MORE IMPORTANT--WHAT IS IN A MEAL OR WHAT YOU HAVE EATEN BY THE END OF THE DAY?

WHAT THINGS SHOULD YOU EAT EACH DAY?

Collect each student score sheet and use Tallysheet 3-7 to summarize student success with the game. Note which students need help in understanding the game and plan to play the game with them the next day. If a few

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
s:	Students:
THE KIND OF MEAL WE USUALLY EAT?	--respond, "No," "Yes," "Sometimes," "Not very often."
that the meals students lay down in the game essarily be standard meals. This discussion ish the notion that a meal does not have to e usual meat, vegetable, and salad -- or the student may normally eat. rtant is that as long as the required number from each food group is satisfied, the makeup becomes a personal preference.	
aying: UGH THIS IS NOT THE USUAL KIND OF MEAL IS IT A NUTRITIOUS MEAL?	--infer because a variety of food groups are represented, "Yes, it is a nutritious meal."
, TO BE FULL AND HEALTHY EACH DAY YOU LEAST TWO SERVINGS OF MEAT OR MEAT TES, TWO SERVINGS OF MILK OR MILK , FOUR SERVINGS OF FRUITS AND VEGETABLES, OF BREADS AND CEREALS.	
MORE IMPORTANT--WHAT IS IN A MEAL YOU HAVE EATEN BY THE END OF THE DAY?	--reply, "What you have eaten by the end of the day."
NGS SHOULD YOU EAT EACH DAY?	--reply, "The right number of servings from each food group."
student score sheet and use Tallysheet 3-7 student success with the game. Note which help in understanding the game and plan ame with them the next day. If a few	

MATERIALS

Slide 3-27

Worksheet 3-15

Date _____ Name _____

SCORESHEET
FULL AND HEALTHY GAME

	MEAT	DAIRY	FRUIT & VEGETABLES	BREADS & CEREALS	ENERGY HIGH	ENERGY LOW
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
SATURDAY						
SUNDAY						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
SATURDAY						
SUNDAY						

TEACHING STRATEGIES

students are winners, group these together so that they have more challenge and so others can be winners in the other groups. The group of winners might like to add the High- and Low-Energy rules to their games. The next time the game is played, return the worksheets you collected; it contains a second score sheet that can be used.

If students demonstrate a complete understanding of the game and are having no great difficulty playing it, the next time they play the game add Energy to the rules. Both variations of the game may be played on succeeding days.

To introduce the rules for adding Energy to the game, distribute Worksheet 3-15 and project Slide 3-27. Say:

> ONE THING WE DID NOT CONSIDER WHEN PLAYING OUR GAME AND PLANNING DAILY MEALS WAS HOW MUCH ENERGY EACH FOOD GIVES US.
>
> WHAT WOULD HAPPEN IF YOU ATE FOODS THAT JUST HAD A LOT OF ENERGY OR CALORIES BUT NOT MUCH ELSE?
>
> ON YOUR CARDS YOU WILL FIND A PLACE THAT INDICATES WHETHER THE FOOD IS HIGH IN ENERGY OR LOW IN ENERGY.
>
> THIS TIME WHEN WE PLAY THE GAME YOU WANT TO MAKE SURE THAT YOU DON'T HAVE ALL HIGH-ENERGY FOODS OR ALL LOW-ENERGY FOODS, BUT SOME OF EACH. NOW, IN ORDER TO WIN, YOU MUST HAVE THREE MEALS LAID DOWN, THE RIGHT NUMBER FROM EACH FOOD GROUP, AND THESE MUST INCLUDE <u>AT LEAST THREE HIGH-ENERGY FOODS AND THREE LOW-ENERGY FOODS</u>. IF YOU HAVE MORE, FINE, BUT YOU MUST HAVE AT LEAST THREE OF EACH.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
e winners, group these together so that they hallenge and so others can be winners in the s. The group of winners might like to add nd Low-Energy rules to their games. The next me is played, return the worksheets you it contains a second score sheet that can be	Students:
demonstrate a complete understanding of the e having no great difficulty playing it, me they play the game add Energy to the rules. ions of the game may be played on succeeding	
e the rules for adding Energy to the game, Worksheet 3-15 and project Slide 3-27. Say: ING WE DID NOT CONSIDER WHEN PLAYING ME AND PLANNING DAILY MEALS WAS HOW NERGY EACH FOOD GIVES US. OULD HAPPEN IF YOU ATE FOODS THAT AD A LOT OF ENERGY OR CALORIES BUT CH ELSE?	--infer, "You'd get fat," "Get sick," "It wouldn't be healthy."
R CARDS YOU WILL FIND A PLACE THAT TES WHETHER THE FOOD IS HIGH IN OR LOW IN ENERGY. IME WHEN WE PLAY THE GAME YOU WANT TO URE THAT YOU DON'T HAVE ALL HIGH-ENERGY OR ALL LOW-ENERGY FOODS, BUT SOME OF EACH. N ORDER TO WIN, YOU MUST HAVE THREE LAID DOWN, THE RIGHT NUMBER FROM EACH ROUP, AND THESE MUST INCLUDE AT LEAST HIGH-ENERGY FOODS AND THREE LOW-ENERGY IF YOU HAVE MORE, FINE, BUT YOU MUST LEAST THREE OF EACH.	

ACTIVITY 3-13

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MATERIALS	TEACHING STRATEGIES
	A demonstration might be necessary. DEMONS GAME Make the card game available for use during free periods, homerooms, etc.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ration might be necessary.	
GAME TIME	
card game available for use during free periods, etc.	

Teacher _____

Date _____

UNIT III, CORE B

TALLYSHEET 3-7: Success on the Full and Healthy Game - Worksheet 3-14

ACTIVITY 3-13: "A Winner Is Full And Healthy"

This tallysheet will help you identify students who do not understand the game or are less successful than others. The next time the game is played you may want to group the winners together to give them more challenge and allow others to win in the other groups.

In column 1 circle yes if your observation and the way the scorecard is filled out indicate that the student understands the game. If he has won a game, he probably understands it. Circle no if you observed that the student did not know how to play it or his score sheet is not filled out right.

In column 2, circle the number of games played.

In column 3, circle the number of times he was a winner.

In column 4, enter the number of foods the student had played in the last completed game. This information may not have much meaning for you, but might help BSCS learn more about and improve the game.

	1 Understands		2 Games Played	3 # of Wins	4 Pattern of foods in last game			
KEY:	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7	Meat	Dairy	Fruit & Veg.	Breads
Attach ID list here. 01	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				

In column 4, enter the number of foods the student had played in the last completed game. This information may not have much meaning for you, but might help BSCS learn more about and improve the game.

		1 Understands		2 Games Played	3 # of Wins	4 Pattern of foods in last game			
	KEY:	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7	Meat	Dairy	Fruit & Veg.	Breads
Attach ID list here.	01	yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				
		yes	no	1 2 3 4 5 6 7	1 2 3 4 5 6 7				

UNIT III, CORE B

ACTIVITY 3-13: "A Winner Is 'Full And Healthy'"

Activity name suggested by class: _____

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

	Number of students responding with: (Number)	Name students you noted especially:
HIGH INTEREST		
MODERATE INTEREST		
INDIFFERENCE		
MODERATE RESISTANCE		
STRONG DISLIKE		
HARD TO RATE		

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
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9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Were your students unfamiliar with some of the foods in the "Full and Healthy" game?
☐ No ☐ Yes: Which ones and what did you do?

18. How many students were able to play the game using the Energy rules?
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Please complete Tallysheet 3-7 of Worksheet 3-14 showing student success playing the "Full and Healthy" game and send it in with this worksheet.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B

ACTIVITY 3-13: "A Winner Is 'Full And Healthy'"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

MATERIALS

Worksheet 3-16
*35mm Slide Projector
Slide 3-28 and 3-29

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-14. Popeye's Quick Energy -- Review Of Success

This activity provides a review of the concepts of energy and food and how the two are interrelated.

Begin by distributing Worksheet 3-16. As students read silently, read the story aloud in a dramatic and/or humorous manner.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

BSCS

ACTIVITY 3-14. POPEYE'S QUICK ENERGY -- REVIEW OF SUCCESS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

TEACHING STRATEGIES

-14. Popeye's Quick Energy -- Review Of Success

ty provides a review of the concepts of food and how the two are interrelated.

stributing Worksheet 3-16. As students read ead the story aloud in a dramatic and/or nner.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have selected a correct answer to each of the four questions on Worksheet 3-16.

MATERIALS

TEACHING STRATEGIES

POPEYE'S QUICK ENERGY

"HELP, HELP." POPEYE HEARD OLIVE OYL'S DISTANT CRIES. HE LOOKED OUT THE DOOR JUST IN TIME TO SEE HER DISAPPEAR DOWN THE HILL UNDER THE ARM OF HIS ARCH RIVAL, BRUTUS.

"I MUST BE QUICK," THOUGHT POPEYE, "OR BRUTUS WILL HAVE VANISHED WITH MY SWEET OLIVE OYL AND I MAY NEVER FIND HER AGAIN." POPEYE TURNED TO HIS CAN OF SPINACH. "MY SUPPLY IS GONE!!" HE GROANED. "HELP! WHAT SHALL I DO? IN JUST FIVE SHORT MINUTES SHE WILL BE GONE FOREVER!!" QUICK-THINKING POPEYE LOOKED AT HIS EVER-HANDY CALORIE BOOK:

CALORIE BOOK

FOOD	CALORIES PER SERVING
Baked Beans	135
Bread	64
Milk	90
Oranges	30
Peanuts	174
Sugar	116
Syrup	76
T-bone steak	200
Carrots	20

"AH, HERE IT IS AT LAST--JUST WHAT I NEED!" WITH THE SPEED OF LIGHTNING HE RAN TO HIS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

POPEYE'S QUICK ENERGY

HELP." POPEYE HEARD OLIVE OYL'S DISTANT
HE LOOKED OUT THE DOOR JUST IN TIME TO
R DISAPPEAR DOWN THE HILL UNDER THE ARM
ARCH RIVAL, BRUTUS.

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D. "HELP! WHAT SHALL I DO? IN JUST FIVE
MINUTES SHE WILL BE GONE FOREVER!!" QUICK-
NG POPEYE LOOKED AT HIS EVER-HANDY
E BOOK:

CALORIE BOOK

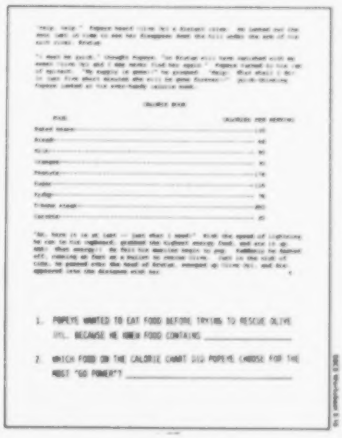
	CALORIES PER SERVING
Beans	135
	64
	90
S	30
S	174
	116
	76
steak	200
S	20

RE IT IS AT LAST--JUST WHAT I NEED!"
E SPEED OF LIGHTNING HE RAN TO HIS

MATERIALS

Slide 3-28

Worksheet 3-16 (Front)


Date _____ Name _____

1. POPEYE WANTED TO EAT FOOD BEFORE TRYING TO RESCUE OLIVE OYL. BECAUSE HE KNEW FOOD CONTAINS _____

2. WHICH FOOD ON THE CALORIE CHART DID POPEYE CHOOSE FOR THE MOST "GO POWER"? _____

TEACHING STRATEGIES

CUPBOARD, GRABBED THE HIGHEST ENERGY FOOD, AND ATE IT UP. AHA! WHAT ENERGY!! HE FELT HIS MUSCLES BEGIN TO POP. SUDDENLY HE DASHED OFF, RUNNING AS FAST AS A BULLET TO RESCUE OLIVE. JUST IN THE NICK OF TIME, HE PASSED OVER THE HEAD OF BRUTUS, SWOOPED UP OLIVE OYL, AND DISAPPEARED INTO THE DISTANCE WITH HER.

Next, project Slide 3-28 and read aloud the questions on the back of the worksheet.

Allow time for the students to answer them individually.

1. POPEYE WANTED TO EAT FOOD BEFORE TRYING TO RESCUE OLIVE OYL BECAUSE HE KNEW FOOD CONTAINS _____.

2. WHICH FOOD ON THE CALORIE CHART DID POPEYE CHOOSE FOR THE MOST "GO POWER"?

3. WHY DID YOU SAY THIS FOOD HAS THE MOST "GO POWER"?

4. WHICH WOULD YOU HAVE TO EAT THE MOST OF TO GET THE SAME AMOUNT OF ENERGY?

5. IN ORDER FOR POPEYE TO CONTINUE TO BE STRONG DAY AFTER DAY, WHICH MEAL SHOULD HE EAT?

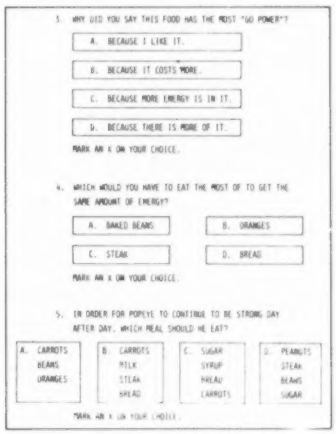
Collect the worksheets, then read the questions aloud. Ask for volunteers to answer each question. When the

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ARD, GRABBED THE HIGHEST ENERGY FOOD, TE IT UP. AHA! WHAT ENERGY!! HE FELT USCLES BEGIN TO POP. SUDDENLY HE DASHED RUNNING AS FAST AS A BULLET TO RESCUE . JUST IN THE NICK OF TIME, HE PASSED THE HEAD OF BRUTUS, SWOOPED UP OLIVE OYL, ISAPPEARED INTO THE DISTANCE WITH HER.	
ect Slide 3-28 and read aloud the questions on f the worksheet.	--read worksheet silently.
for the students to answer them individually.	--answer questions.
OPEYE WANTED TO EAT FOOD BEFORE TRYING TO ESCUE OLIVE OYL BECAUSE HE KNEW FOOD ONTAINS _____.	--respond, "Energy," "Calories," or "Power to do work."
HICH FOOD ON THE CALORIE CHART DID POPEYE HOOSE FOR THE MOST "GO POWER"?	--study the energy chart and insert "Steak" in the blanks on their worksheets.
HY DID YOU SAY THIS FOOD HAS THE MOST "GO OWER"?	--study the sample responses on their worksheets and mark "Because more energy is in it."
HICH WOULD YOU HAVE TO EAT THE MOST OF TO ET THE SAME AMOUNT OF ENERGY?	--study the energy chart and mark "oranges" on their worksheets.
N ORDER FOR POPEYE TO CONTINUE TO BE TRONG DAY AFTER DAY, WHICH MEAL SHOULD E EAT?	--study the menus and mark "carrots, milk, steak, and bread."
e worksheets, then read the questions aloud. lunteers to answer each question. When the	

MATERIALS

Slide 3-29

Worksheet 3-16 (Back)



3. WHY DID YOU SAY THIS FOOD HAS THE MOST "GO POWER"?

A. BECAUSE I LIKE IT.

B. BECAUSE IT COSTS MORE.

C. BECAUSE MORE ENERGY IS IN IT.

D. BECAUSE THERE IS MORE OF IT.

MARK AN X ON YOUR CHOICE.

4. WHICH WOULD YOU HAVE TO EAT THE MOST OF TO GET THE SAME AMOUNT OF ENERGY?

A. BAKED BEANS B. ORANGES

C. STEAK D. BREAD

MARK AN X ON YOUR CHOICE.

5. IN ORDER FOR POPEYE TO CONTINUE TO BE STRONG DAY AFTER DAY, WHICH MEAL SHOULD HE EAT?

A.	B.	C.	D.
CARROTS	CARROTS	SUGAR	PEANUTS
BEANS	MILK	SYRUP	STEAK
ORANGES	STEAK	BREAD	BEANS
	BREAD	CARROTS	SUGAR

MARK AN X ON YOUR CHOICE.

TEACHING STRATEGIES

class agrees on an answer, have the students write the correct word or words in the space provided.

Complete Tallysheet 3-8 and note which students are having difficulty and assist them individually, reviewing those concepts with which they are having trouble.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
es on an answer, have the students write the rd or words in the space provided. allysheet 3-8 and note which students are having and assist them individually, reviewing those ith which they are having trouble.	

Teacher _____

Date _____

UNIT III, CORE B
TALLYSHEET 3-8: Tally of Worksheet 3-16
ACTIVITY 3-14: "Review Of Success"

Tally each student's responses to Worksheet 3-16 as indicated below.

Question 1. While the word "Energy" is the expected answer, "Calories," or "Power to do work" would also be correct. Make a check mark in the appropriate column, or if another response such as "power to do work" is given, please write it in.

Question 2. Check the column to indicate which food was selected. If a student has chosen a food not listed, write it down in the "Other" column.

Question 3. See back of this tallysheet for Questions 3, 4, and 5.

		1 (Energy)			2 (Food With Most "Go Power")				
	KEY:	Energy	Calories	Other	Steak	Peanuts	Beans	Sugar	Other
Attach ID list here.	01			_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____
				_____					_____

Question 3. See back of this tallysheet for Questions 3, 4, and 5.

		1 (Energy)			2 (Food With Most "Go Power")				
	KEY:	Energy	Calories	Other	Steak	Peanuts	Beans	Sugar	Other
Attach ID list here.	01								

TALLYSHEET 3-8: Tally of Worksheet 3-16

Question 3. The options will be refered to from top to bottom as A B C D. Choice C, "Because more energy is in it," is the best answer. Students who chose this response should also have chosen Steak as the answer to Question 2.

Question 4. The options from left to right will be refered to as A B C D. Choice B, "Oranges," is the best answer.

Question 5. The options from left to right will be refered to as A B C D. Choice D, "Carrots, Milk, Steak, Bread" is the best response. Review if necessary and provide continuing opportunities to play the "Full and Healthy" game.

		3 (More Energy)				4 (Oranges)				5			
	KEY:	A	B	(C)	D	A	(B)	C	D	A	B	C	(D)
Attach ID list here.	01	A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D
		A	B	C	D	A	B	C	D	A	B	C	D

A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
A	B	C	D	A	B	C	D	A	B	C	D
TOTALS:	___	___	___	___	___	___	___	___	___	___	___

Does this review give an accurate indication of student understanding? ☐ Yes ☐ No

If not, what other evidence do you have of student learning?

UNIT III, CORE B
ACTIVITY 3-14: "Review Of Success"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with:	(Number)	Name students you noted especially:
HIGH INTEREST		
MODERATE INTEREST		
INDIFFERENCE		
MODERATE RESISTANCE		
STRONG DISLIKE		
HARD TO RATE		

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Please tally each student's responses to Worksheet 3-16 on Tallysheet 3-8 and send it in with this worksheet.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B
ACTIVITY 3-14: "Review Of Success"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

UNIT III
REACTIONS TO CORE B

1. Was the background information for this core adequate? ☐ Yes ☐ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First

W = white
B = black
S = Spanish-American
O = other

W = WISC
B = Binet
O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

c Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

hite
lack
panish-
merican
ther

W = WISC
B = Binet
O = other
(name)

SIDE B

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the ene
2. Appreciate and understand man'

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1. Realize that food is the only
2. Realize that food can be trace
3. Realize that all food chains be
4. Appreciate that man and all oth upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. Know that energy flows from one food chain.
8. State the sources of food for
9. Appreciate the interrelationshi
10. Understand the consequences tha

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

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UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE C

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
3. Realize that all food chains begin with a green plant.
4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. Know that energy flows from one kind of organism to another kind of organism in a food chain.
8. State the sources of food for various organisms.
9. Appreciate the interrelationships of organisms in a food web.
10. Understand the consequences that the removal of an organism has on a food web.

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT
CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

CORE C RATIONALE

The students have learned that energy is the driving force which makes all movement or change possible. They have also learned that food supplies them with their energy requirements. Regardless of what kind of animal you may consider, each is faced with a similar problem--in order to survive it must have a source of food to satisfy its energy needs.

A main purpose of this core is to impress on the student that the life of every living thing is affected by the lives of other living things. Nowhere is this relationship more obvious than in the area of nutrition, for most interactions between living things involve food. If a deer does not have grass or browse on which to feed, it dies. Without deer a mountain lion would be in danger of starvation. If alternate sources of food were not readily available, such as rabbits, it too would die. Activities in Core C are designed to show that the role or fate of any organism is directly or indirectly related to its eating habits.

Within any community one will find plants, plant eaters, animal eaters, and other organisms feeding on both plants and animals. The relationship between organisms in an environmental community is best expressed as a food chain.

What is not apparent to many people is that each food chain has a plant in some form as the beginning link in the chain. The foods of all animals, including man, can be traced to plants, and therefore, ultimately to the sun. The development of this concept begins in Activity 3-15 (My Source Of Food) by having the student trace the ingredients of a commonly eaten food item, a hamburger, to their source. The student finds that all foods do, indeed, have a plant origin. That all foods can ultimately be traced to the sun will be developed in the following core.

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Since animals, obtain their energy plant. That all foo in tracing the sourc Source Of Food). It difference between t food chain dealt wit basically derived fr from a cow, tomato f energy is from one o a hawk. This differe may not be apparent sense that the others tant in maintaining contribute to the gr fats, and proteins.

In Activity 3-1 illustrate that orga organisms. Those org referred to as herbiv Carnivores are animal animal eaters. Man plants and animals. to as plant and anima

The feeding rela community is termed a illustrated by an exa student is made aware kills a snake for din a frog, which in turn been feeding on grass

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also learned that food
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BACKGROUND INFORMATION FOR THE TEACHER

Since animals, including man, do not make their own food, they must obtain their energy by eating a plant or another animal that has eaten a plant. That all food eaten can be traced to plants is readily apparent in tracing the source of the parts of a hamburger in Activity 3-15 (My Source Of Food). It is important for you as a teacher to note the subtle difference between the food source dealt with in this activity and the food chain dealt with in future activities. In a food source, a food is basically derived from the same organism, e.g., milk from a cow, butter from a cow, tomato from a tomato plant. In a food chain, the transfer of energy is from one organism to another, e.g., from a mouse to a snake to a hawk. This differentiation is made in Activities 3-16 and 3-17. What may not be apparent is that some of the ingredients are not food in the sense that the others are. Such things as salt and water, while important in maintaining a properly functioning body, do not supply energy or contribute to the growth and repair of body tissue as do carbohydrates, fats, and proteins.

In Activity 3-16 (Who Eats Whom?) examples have been selected to illustrate that organisms unable to make their own food eat other organisms. Those organisms which feed on plants, while technically referred to as herbivores, are referred to here as plant eaters. Carnivores are animals which eat other animals and are referred to as animal eaters. Man is an example of an omnivore, one who eats both plants and animals. For the sake of simplicity, omnivores are referred to as plant and animal eaters.

The feeding relationship among animals within an environmental community is termed a food chain. Such a relationship is best illustrated by an example. In Activity 3-17 (The Food Chain Game) the student is made aware of a chain that has a hawk at one end. The hawk kills a snake for dinner. The snake only a short time before had eaten a frog, which in turn had dined on a grasshopper. The grasshopper had been feeding on grass.

CORE C RATIONALE (continued)

To function in a positive way in the natural world, and to understand it, the student must realize that a food chain represents only an isolated strand in a more complicated network of feeding relationships that exists in each environmental community. One organism may serve as a link in several food chains. Since food chains are interconnected, the feeding relationships can be thought of as a food web. Before he can appreciate these relationships the student must be familiar with what particular animals normally eat. This is accomplished in Activity 3-16 (Who Eats Whom?) where the eating habits of a selected group of animals are examined. Putting this newly gained knowledge to use, the student is given the opportunity to construct many food chains by playing the Food Chain Game in Activity 3-17. The complexity of food chains is then made apparent by the construction of several food webs in Activity 3-18 (Construction Of A Food Web). The worksheet constructed by the students in this last activity dramatically illustrates the far-reaching interdependence of individuals in the food web.

These food interrelationships are fundamental in establishing the kinds and numbers of organisms in a community. Man, because he is an integral part of numerous chains, and because he has the potential to affect so many others, must recognize the many invisible threads which tie him to the natural world. In Activity 3-18 the concept is also introduced that any reduction, addition, or change in the size of a population within a web can have dramatic consequences. This concept is developed more fully in Unit V. Activity 3-19 (Nature's Delicate Balance--Review Of Success) provides a review and opportunity for applying the concepts in this core by writing a story to fit a picture booklet on the interrelationships of living things.

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BACKGROUND INFORMATION FOR THE TEACHER (continued)

The above example involves more organisms than some food chains and less than others. All, however, have one thing in common--they start with a green plant.

If most or all of the chains are examined together as they relate to one another, the result is a weblike arrangement within the environmental community. A food web expresses a far more complex set of relationships than does a food chain. To illustrate, the hawk population in the above example depends on the survival of all other populations in the food chain. If a fox eats the snake, or a mouse eats the grasshopper, then the hawk and the frog would need to look elsewhere for food. These animals are part of several different interrelated food chains, making up what is called a food web. Further clarification of food webs is provided for the students in the examples in Activity 3-18 (Construction Of A Food Web). The interdependence of plants and animals in a food web is reinforced through creative storytelling in Activity 3-19 (Nature's Delicate Balance--Review Of Success). In a pamphlet without words, students develop their own story, integrating the delicate balance among living organisms such as men, mountain lions, deer, and green plants.

Me and my Environment

UNIT III
CORE C

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the m*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies needed

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics and*
3-15. My Source Of Food Page _____ Date planned _____	Overhead projector	Transparency 3-3 Transparency 3-4	Tracing The Sourc Terminal Sources
3-16. Who Eats Whom? Page _____ Date planned _____	35mm Slide projector	Animal flash cards Slide 3-30 Slide 3-31	One deck Kangaroo Kangaroo eating
3-17. The Food Chain Game Page _____ Date planned _____		Animal flash cards Game - *Food Chain*	One deck Four decks of car
3-18. Construction Of A Food Web Page _____ Date planned _____	Pieces of heavy corrugated cardboard Colored rubber bands Colored chalk 35mm Slide projector		*Four pieces 8 1/2* *boxes well in a* About twenty-five One box

PLANNING GUIDE

e activities (*indicated in italics and an* ☛ *in the margin*) must
prepared several days or weeks in advance. Use this summary as
eaching and preparation schedule. All supplies needed are listed.

BSCS

t of Supplies Needed		
h	Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Transparency 3-3 Transparency 3-4	Tracing The Source of a Hamburger Terminal Sources of a Hamburger
	Animal flash cards Slide 3-30 Slide 3-31	One deck Kangaroo Kangaroo eating
	Animal flash cards Game - *Food Chain*	One deck Four decks of cards
ted		*Four pieces 8 1/2" X 11" for each pair of students. Collect old boxes well in advance in order to have enough cardboard.* About twenty-five per pair of students One box

Me and my Environment

UNIT III
CORE C

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the m*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies neede

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics an*
3-18. Construction Of A Food Web (Continued)		Animal flash cards Worksheet 3-17 Worksheet 3-18 Slide 3-32 Slide 3-33 Slide 3-34	One deck Food Web A Food Web B Sample food web Worksheet 3-17 Worksheet 3-18
3-19. Nature's Delicate Balance--Review Of Success Page _____ Date planned _____	35mm Slide projector	Worksheet 3-19 Slide 3-35 Slide 3-36 Booklet *Nature's Delicate Balance*	Review Of Succes Review Of Succes Review Of Succes One per student

PLANNING GUIDE

e activities (*indicated in italics and an* ☛ *in the margin*) must
prepared several days or weeks in advance. Use this summary as
eaching and preparation schedule. All supplies needed are listed.

BSCS

t of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
h	Materials in Supply Kit	
	Animal flash cards	One deck
	Worksheet 3-17	Food Web A
	Worksheet 3-18	Food Web B
	Slide 3-32	Sample food web
	Slide 3-33	Worksheet 3-17
	Slide 3-34	Worksheet 3-18
	Worksheet 3-19	Review Of Success
	Slide 3-35	Review Of Success Question 1
	Slide 3-36	Review Of Success Question 2
	Booklet *Nature's Delicate Balance*	One per student

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.

2. Realize that food can be traced to a plant source.

5. Trace a food to its source.

6. Construct food chains and webs.

MATERIALS

TEACHING STRATEGIES

Activity 3-15. My Source Of Food

By tracing food chains to their source, the students will infer that plants are the source of energy in the food they consume. This is an important concept in the development of subsequent activities.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

ACTIVITY 3-15. MY SOURCE OF FOOD

BSCS

VE FOCUS FOR THIS ACTIVITY

IT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

RE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.

2. Realize that food can be traced to a plant source.

5. Trace a food to its source.

6. Construct food chains and webs.

TEACHING STRATEGIES

3-15. My Source Of Food

ing food chains to their source, the students will at plants are the source of energy in the food sume. This is an important concept in the ent of subsequent activities.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have suggested where the energy in food comes from.
--have participated in identifying the ingredients of a hamburger.
--have used the word "source" appropriately.
--have discovered that all of the hamburger ingredients came previously from plants.
--have traced at least one other food product to plants.
--have stated that he is dependent on plants for his food.

ACTIVITY 3-15

MATERIALS	TEACHING STRATEGIES
Transparency 3-3 Transparency 3-4 *Overhead projector	<u>Teacher Preparation</u>: 1. Have the overhead projector set up and ready to use. 2. Familiarize yourself with the transparencies. Have the students recall the Popeye Story (Activity 3-14) and ask: WHY DID POPEYE GO TO THE SHELF? WHY DID HE WANT FOOD? WHY DO YOU EAT FOOD? POPEYE WENT TO THE SHELF FOR FOOD. WHERE DO YOU GET YOUR FOOD?
Transparency 3-3	Then say: WE GET FOOD FROM THE GROCERY STORE, BUT WHERE DOES THE FOOD IN THE GROCERY STORE COME FROM?
*Not furnished in materials kit	After the various general responses have been listed, project Transparency 3-3 with only the hamburger, bun, and condiments exposed. (The center of the transparency with stippled circle around it.)

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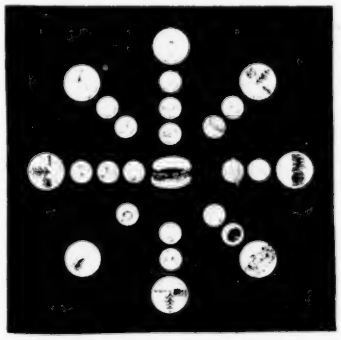
ASK FOR
OTHER IDEA

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
aration:	
he overhead projector set up and ready to use.	
arize yourself with the transparencies.	
dents recall the Popeye Story (Activity 3-14)	
POPEYE GO TO THE SHELF?	--respond, "For food."
HE WANT FOOD?	--respond, "For energy."
OU EAT FOOD?	--recall the *Full and Healthy* game and respond, "For energy."
ENT TO THE SHELF FOR FOOD. WHERE DO YOU FOOD?	--respond, "Grocery store," "Shelves," "Drive-in," "Restaurant."
OOD FROM THE GROCERY STORE, BUT WHERE FOOD IN THE GROCERY STORE COME FROM?	--respond, "Plants," "Animals," "Gardens," "Farms," "Ranches."
ASK FOR OTHER IDEAS	
rious general responses have been listed, sparency 3-3 with only the hamburger, bun, and xposed. (The center of the transparency with cle around it.)	

MATERIALS	TEACHING STRATEGIES
	LET'S SEE WHERE ALL THE THINGS IN A HAMBURGER WITH "THE WORKS" COME FROM. Expose the picture of the meat and ask: WHERE DOES THE MEAT IN A HAMBURGER COME FROM? After the correct response, expose the picture of the cow. Then say: ANOTHER WAY TO SAY THAT MEAT IN A HAMBURGER COMES FROM A COW IS TO SAY THAT THE SOURCE OF THE MEAT IS A COW. Write "source" on the chalkboard and have the class pronounce the word. WHAT DID THE COW EAT TO MAKE THE MEAT THAT THE HAMBURGER CAME FROM? ANOTHER WAY TO TALK ABOUT THE (grass) THAT THE COW EATS IS TO SAY THAT THE FOOD SOURCE FOR THE COW IS (grass). When the plant sources are given, expose the picture of grass, hay, and corn. Then proceed to another ingredient of the total hamburger. Expose one step at a time in tracing each source. In developing the sources of the bun, proceed by asking: WHO CAN TELL ME WHAT A HAMBURGER BUN IS MADE FROM?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
'S SEE WHERE ALL THE THINGS IN A HAMBURGER H "THE WORKS" COME FROM.	
he pi cture of the meat and ask:	
RE DOES THE MEAT IN A HAMBURGER COME FROM?	--suggest that the source is beef or a cow.
e correct response, expose the picture of the cow. :	
THER WAY TO SAY THAT MEAT IN A HAMBURGER ES FROM A COW IS TO SAY THAT THE SOURCE THE MEAT IS A COW.	
ource" on the chalkboard and have the class e the word.	
T DID THE COW EAT TO MAKE THE MEAT THAT HAMBURGER CAME FROM?	--indicate, "Food," "Hay," "Grass," "Corn."
THER WAY TO TALK ABOUT THE (grass) THAT COW EATS IS TO SAY THAT THE FOOD SOURCE THE COW IS (grass).	
plant sources are given, expose the picture of ay, and corn. Then proceed to another ingredient otal hamburger. Expose one step at a time in each source. In developing the sources of the ceed by asking:	
CAN TELL ME WHAT A HAMBURGER BUN IS MADE FROM?	--generally suggest ingredients, such as flour and milk.

MATERIALS



Transparency 3-4

TEACHING STRATEGIES

List the correct replies on the chalkboard. Supply those that are missing so that the completed list includes: milk, sugar, yeast, and flour. Then proceed as before in exposing each step, one at a time. Reinforce the use of the word source.

If students bypass a step, for example from ketchup to tomato plant, accept the answer and ask:

> WHAT PART OF THE TOMATO PLANT IS USED IN MAKING KETCHUP?

When all of the components have been completed ask:

> AS WE TRACED EACH FOOD PART OF A HAMBURGER TO ITS SOURCE, DID YOU NOTICE ANYTHING THAT WAS THE SAME ABOUT THE SOURCES?

Project Transparency 3-4. Point to the seven plants and ask:

> HERE ARE THE THINGS WE ENDED UP WITH WHEN WE TRACED THE HAMBURGER TO ITS SOURCES. HOW ARE THEY ALIKE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
rect replies on the chalkboard. Supply those sing so that the completed list includes: milk, , and flour. Then proceed as before in h step, one at a time. Reinforce the use of rce.	
bypass a step, for example from ketchup to , accept the answer and ask:	
RT OF THE TOMATO PLANT IS USED IN MAKING ?	--state, "The tomato."
the components have been completed ask:	
RACED EACH FOOD PART OF A HAMBURGER SOURCE, DID YOU NOTICE ANYTHING THAT SAME ABOUT THE SOURCES?	--conclude that the eight components of a hamburger can all be traced to plants.
sparency 3-4. Point to the seven plants and	
E THE THINGS WE ENDED UP WITH WHEN WE THE HAMBURGER TO ITS SOURCES. HOW ARE IKE?	--reply, "All are plants," "All grow in the ground," "All need water."

HAVE YOU INVOLVED ALL STUDENTS?

MATERIALS	TEACHING STRATEGIES
	WE HAVE TRACED SOME OF THE FOOD WE EAT TO PLANTS. YOU WOULD FIND THAT NO MATTER WHAT FOOD WE EAT, WE COULD TRACE IT TO PLANTS. NOW LET'S TRY IT WITH SOME OTHER FOODS. Call on a student to suggest a food. As a class, trace back the food to its sources as far as possible. Write the source sequence on the chalkboard as students state them. Some examples of foods to trace are listed below. crust < shortening-animals-grains; flour - wheat; water; salt PIZZA < sausage - pig - grains; cheese - milk - cow - grains; tomato sauce - tomato - tomato plant noodles < flour - wheat; water; salt SPAGHETTI < hamburger - cow - grains; sauce - tomato - tomato plant; spices - plants

TEACHING STRATEGIES

E TRACED SOME OF THE FOOD WE EAT TO PLANTS.
ULD FIND THAT NO MATTER WHAT FOOD WE EAT,
LD TRACE IT TO PLANTS. NOW LET'S TRY IT
OME OTHER FOODS.

tudent to suggest a food. As a class, trace
od to its sources as far as possible. Write
sequence on the chalkboard as students state

es of foods to trace are listed below.

crust
- shortening-animals-grains
- flour - wheat
- water
- salt

sausage - pig - grains

cheese - milk - cow - grains

tomato sauce - tomato - tomato plant

noodles
- flour - wheat
- water
- salt

hamburger - cow - grains

sauce - tomato - tomato plant

spices - plants

ANTICIPATED STUDENT BEHAVIORS

Students:

--trace additional food sources.

ACTIVITY 3-15

MATERIALS	TEACHING STRATEGIES
	CHOCOLATE CHIP COOKIES: chocolate chips-cocoa bean-cocoa bean plant; sugar - sugar beet - sugar beet plant; flour - wheat; butter - milk - cow - grains
	ICE CREAM: milk - cow - grains; sugar - sugar beet - sugar beet plant; vanilla - vanilla bean
	PEANUT BUTTER SANDWICH: bread: shortening - animals - grains; flour - wheat; milk - cow - grains; salt; peanut butter-peanuts-peanut plant

INVOLVE YOU SLOWEST STUDENTS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
chocolate chips-cocoa bean-cocoa bean plant sugar - sugar beet - sugar beet plant flour - wheat butter - milk - cow - grains	
milk - cow - grains sugar - sugar beet - sugar beet plant vanilla - vanilla bean	
INVOLVE YOUR SLOWEST STUDENTS	
bread: shortening - animals - grains flour - wheat milk - cow - grains salt	
peanut butter-peanuts-peanut plant	

MATERIALS	TEACHING STRATEGIES	
	NOTE: Spices, water, and salt are considered to be nutrients but not food. Since they do not give us energy they are not considered foods. This may need to be explained to the students. Conclude the activity by asking: HOW IMPORTANT, THEN, DO YOU THINK PLANTS ARE FOR YOUR FOOD? WHAT IS THE SOURCE OF ALL OF OUR FOOD? Accept all answers which imply that without plants we could not have any foods.	St -- --

GIVE SEVE
STUDENTS A
TO RESPO

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
es, water, and salt are considered to be rients but not food. Since they do not give energy they are not considered foods. This may d to be explained to the students.	
e activity by asking:	
MPORTANT, THEN, DO YOU THINK PLANTS ARE UR FOOD?	--describe in their own words that they are dependent upon plants for all of their food.
S THE SOURCE OF ALL OF OUR FOOD?	--describe in their own words that they are dependent upon plants for all of their food.
answers which imply that without plants we ave any foods.	

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

UNIT III, CORE C
ACTIVITY 3-15: "My Source Of Food"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did any students have difficulty tracing different foods to their sources?
☐ No ☐ Yes: What did you do?

18. Were students confused about nutrients we need (water, salt, etc.) that are not foods? ☐ No ☐ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

BSCS Evaluation: EMH Feedback Form 1c

UNIT III, CORE C
ACTIVITY 3-15: "My Source Of Food"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.

6. Construct food chains and webs.

MATERIALS

Slide 3-30 and Slide 3-31
Deck of animal flash cards
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-16. Who Eats Whom?

This activity, besides emphasizing that animals eat other living things for food (energy), provides an opportunity for the students to become familiar with the eating habits of animals that are included in the food chains and webs developed in succeeding activities.

Begin the activity by directing the students to think about the foods they normally eat. Do this by selecting a member of the class and asking:

WHAT ARE TWO FOODS THAT YOU AND YOUR FAMILY OFTEN EAT AT HOME?

WHAT ARE YOUR TWO FAVORITE FOODS?

FOCUS FOR THIS ACTIVITY

OALS:

. Realize and appreciate the energy inter-relationships between organisms.

. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES:

. Realize that food is the only source of energy for man and all other animals.

. Construct food chains and webs.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

BSCS

ACTIVITY 3-16. WHO EATS WHOM?

TEACHING STRATEGIES

-16. Who Eats Whom?

ity, besides emphasizing that animals eat other ngs for food (energy), provides an opportunity udents to become familiar with the eating animals that are included in the food chains eveloped in succeeding activities.

activity by directing the students to think foods they normally eat. Do this by selecting f the class and asking:

RE TWO FOODS THAT YOU AND YOUR FAMILY EAT AT HOME?

RE YOUR TWO FAVORITE FOODS?

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have identified animals on the flash cards.
--have identified what the animals eat.
--have classified each animal as plant eater, animal eater, or plant and animal eater.
--have successfully participated in the challenge game.

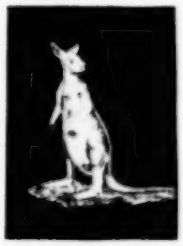
Students:

--name two foods commonly eaten for meals, such as milk, bread, potatoes, meat, hamburger, etc.

--name two favorite foods.

MATERIALS

Slide 3-30



Slide 3-31

TEACHING STRATEGIES

Ask the same questions of two or three other students. Suggest to the entire class that they list six foods they think are most often eaten by most people.

Project Slide 3-30 and ask:

WHAT IS THIS ANIMAL?

If students do not know it is a kangaroo, tell them and ask:

MOST OF US KNOW WHAT OUR PETS EAT, BUT CAN SOMEONE TELL ME WHAT A KANGAROO EATS?

THERE ARE A NUMBER OF ANIMALS THAT WE CAN'T OBSERVE AS EASILY AS WE CAN OUR PETS. SOMETIMES IT'S HARD TO KNOW WHAT THESE ANIMALS EAT.

Project Slide 3-31 and ask:

NOW WHAT DO YOU THINK THE KANGAROO EATS?

THE KANGAROO GRAZES ON PLANTS MUCH LIKE A COW DOES, ALTHOUGH IT SOMETIMES PICKS THE FOOD UP WITH ITS FRONT PAWS.

Hold up a deck of animal flash cards for the students to see and say:

ON THESE CARDS ARE PICTURED OTHER ANIMALS FROM DIFFERENT ENVIRONMENTS. LET'S NAME AS MANY OF THEM AS WE CAN.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ame questions of two or three other students. o the entire class that they list six foods they most often eaten by most people.	
lide 3-30 and ask:	
IS THIS ANIMAL?	--recognize and name animal as a kangaroo.
ts do not know it is a kangaroo, tell them and	
OF US KNOW WHAT OUR PETS EAT, BUT CAN ONE TELL ME WHAT A KANGAROO EATS?	--will probably not be familiar with a kangaroo's eating habits.
E ARE A NUMBER OF ANIMALS THAT WE CAN'T RVE AS EASILY AS WE CAN OUR PETS. SOME- S IT'S HARD TO KNOW WHAT THESE ANIMALS EAT.	
lide 3-31 and ask:	
WHAT DO YOU THINK THE KANGAROO EATS?	--identify leaves of shrubs and grasses.
KANGAROO GRAZES ON PLANTS MUCH LIKE A DOES, ALTHOUGH IT SOMETIMES PICKS THE UP WITH ITS FRONT PAWS.	
deck of animal flash cards for the students to ay:	
HESE CARDS ARE PICTURED OTHER ANIMALS FROM ERENT ENVIRONMENTS. LET'S NAME AS MANY OF AS WE CAN.	

MATERIALS

Fish

Mosquito

Spider

Pig

Hawk

TEACHING STRATEGIES

INVOLVE YO
SLOWEST
STUDENT

One at a time hold the cards up so the students can see the animal pictured but not the name of it. Ask students to identify each animal. Call on all students so that each has the opportunity to identify at least one animal. If students are unfamiliar with a particular animal, or identify any incorrectly, uncover the name so that it may be read by the students.

After going through the deck, say:

> NOW THAT WE HAVE NAMED THE ANIMALS, LET'S TRY TO NAME WHAT THESE ANIMALS NORMALLY EAT.

Again hold up the cards one at a time so the animal on the front is visible and ask the students to try to name the foods eaten by the animal.

The food(s) most commonly eaten by the animal are written on the back of each card. When the students have stated what food(s) they think the animal eats, tell them the food(s) listed on the back of the card. Remind them that the cards do not necessarily list everything an animal might eat, only the major items in the diet.

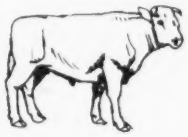
After two or three cards have been discussed, hold up the card picturing the hawk. When the students have had a chance to name the picture and the hawk's food, ask:

> IS THERE ANYTHING THE SAME ABOUT THE FOODS A HAWK EATS? WHAT IS IT THESE HAVE IN COMMON?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
INVOLVE YOUR SLOWEST STUDENTS	
ime hold the cards up so the students can see pictured but not the name of it. Ask students y each animal. Call on all students so that he opportunity to identify at least one animal. s are unfamiliar with a particular animal, or ny incorrectly, uncover the name so that it may the students.	
g through the deck, say:	
HAT WE HAVE NAMED THE ANIMALS, LET'S TRY ME WHAT THESE ANIMALS NORMALLY EAT.	
up the cards one at a time so the animal on is visible and ask the students to try to oods eaten by the animal.	
) most commonly eaten by the animal are written k of each card. When the students have stated s) they think the animal eats, tell them the sted on the back of the card. Remind them that do not necessarily list everything an animal only the major items in the diet.	
or three cards have been discussed, hold up the ring the hawk. When the students have had a name the picture and the hawk's food, ask:	
ERE ANYTHING THE SAME ABOUT THE FOODS A EATS? WHAT IS IT THESE HAVE IN COMMON?	--respond, "They all move," "They crawl." The students may recognize that all are animals.

ACTIVITY 3-16

MATERIALS

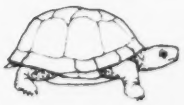


Steer

Mouse

Rabbit

Worm



Turtle

TEACHING STRATEGIES

If students do not perceive that the hawk eats only animals, say:

> THE HAWK EATS ONLY ANIMALS. WE CALL THE HAWK AN ANIMAL EATER.

Hold up the card picturing the cow. When the students have identified the cow and listed the foods they think the cow eats, show them the foods pictured on the back of the card and ask:

> IS THERE ANYTHING THE SAME ABOUT THE FOODS THE COW EATS?
>
> IF WE CALL AN ANIMAL THAT EATS ONLY ANIMALS, LIKE A HAWK, AN ANIMAL EATER, WHAT DO YOU THINK WE CALL AN ANIMAL THAT EATS ONLY PLANTS, LIKE A COW?

Hold up the card of the mouse and have the students name the animal and the food it eats.

Ask:

> IS THERE ANYTHING THE SAME ABOUT THE FOOD A MOUSE EATS?
>
> WHILE MANY ANIMALS EAT ONLY OTHER ANIMALS, AND MANY ANIMALS EAT ONLY PLANTS, THERE ARE QUITE A FEW THAT EAT BOTH PLANTS AND ANIMALS. WHAT DO YOU THINK WE CAN CALL THEM?

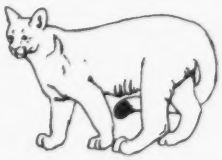
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ts do not perceive that the hawk eats only say: HAWK EATS ONLY ANIMALS. WE CALL THE K AN ANIMAL EATER.	
he card picturing the cow. When the students ntified the cow and listed the foods they think eats, show them the foods pictured on the back of and ask: HERE ANYTHING THE SAME ABOUT THE FOODS THE EATS?	--identify all foods as plants or plant products.
E CALL AN ANIMAL THAT EATS ONLY ANIMALS, A HAWK, AN ANIMAL EATER, WHAT DO YOU K WE CALL AN ANIMAL THAT EATS ONLY TS, LIKE A COW?	--respond, "A plant eater."
he card of the mouse and have the students name l and the food it eats.	
HERE ANYTHING THE SAME ABOUT THE FOOD A E EATS?	--observe and state that mice eat both plant and animal material.
E MANY ANIMALS EAT ONLY OTHER ANIMALS, AND ANIMALS EAT ONLY PLANTS, THERE ARE QUITE W THAT EAT BOTH PLANTS AND ANIMALS. WHAT OU THINK WE CAN CALL THEM?	--respond, "Plant and animal eaters."

MATERIALS

Deer

Frog

Man



Mountain lion

TEACHING STRATEGIES

Continue presenting the animal cards, having the students name what the different animals eat. Now, in addition, after the pictured foods have been shown, ask the students to classify the animal as a plant eater, animal eater, or plant and animal eater.

When all the cards have been studied, prepare the students for a challenge game by asking:

> WHO IN THE CLASS THINKS HE CAN REMEMBER MORE ABOUT WHAT THESE ANIMALS EAT THAN ANYONE ELSE?

Select one member of the class and say:

> (Student's name) THINKS HE KNOWS MORE ABOUT THE FOODS EATEN BY THESE ANIMALS THAN THE REST OF YOU. WHO DISAGREES AND WOULD LIKE TO CHALLENGE HIM IN A CONTEST?

Then say:

> LET'S HAVE A CONTEST.

Have the student who says he knows the most stand to one side of the front of the room. Instruct the challenger to stand on the other side. Both should be in a position to see the cards you hold.

Say:

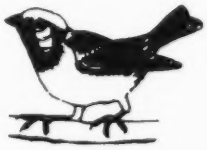
> I WILL FLASH ONE OF THE CARDS SHOWING THE PICTURES OF THE ANIMALS WE HAVE BEEN DISCUSSING. THE FIRST ONE TO NAME A FOOD THE ANIMAL EATS EARNS FIVE POINTS. I WILL DO THIS FOR TEN CARDS. THE ONE WHO EARNS THE MOST POINTS WINS.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
presenting the animal cards, having the students the different animals eat. Now, in addition, pictured foods have been shown, ask the students fy the animal as a plant eater, animal eater, and animal eater.	
the cards have been studied, prepare the students llenge game by asking:	
IN THE CLASS THINKS HE CAN REMEMBER MORE T WHAT THESE ANIMALS EAT THAN ANYONE ELSE?	--raise their hands.
e member of the class and say:	
dent's name) THINKS HE KNOWS MORE ABOUT FOODS EATEN BY THESE ANIMALS THAN THE OF YOU. WHO DISAGREES AND WOULD LIKE TO LENGE HIM IN A CONTEST?	--raise hands indicating willingness to compete.
S HAVE A CONTEST.	
student who says he knows the most stand to one he front of the room. Instruct the challenger on the other side. Both should be in a position e cards you hold.	--come to the front of the room.
LL FLASH ONE OF THE CARDS SHOWING THE URES OF THE ANIMALS WE HAVE BEEN DISCUSSING. FIRST ONE TO NAME A FOOD THE ANIMAL EATS EARNS POINTS. I WILL DO THIS FOR TEN CARDS. THE WHO EARNS THE MOST POINTS WINS.	

ACTIVITY 3-16

MATERIALS

Chicken



Bird

Insects

TEACHING STRATEGIES

One at a time flash ten cards from the deck. Have a student keep score at the chalkboard, scoring five points each round for the winner. If a student is first in naming a food, but the food named is incorrect, the opposing student has the opportunity to name the correct food.

Select two new students to challenge each other. Play the game in the same manner.

NOTE: Select contestants of equal ability or select cards which assure some success for all students. You may wish to have one student flash the cards, one student referee, and one student keep score on the chalkboard.

Possible variations of the game:

1. Winner remains at the front until defeated by a challenger.

2. Require two or more foods to be named for each animal.

3. Identify whether or not the animal is a plant eater, animal eater, or a plant and animal eater.

Continue to play for as long as interest warrants and/or until students have become familiar with the animals and what they eat.

When playing is completed, ask:

WHAT HAVE YOU LEARNED BY PLAYING THIS GAME?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
e flash ten cards from the deck. Have a score at the chalkboard, scoring five points or the winner. If a student is first in d, but the food named is incorrect, the dent has the opportunity to name the correct	--call out names of foods as individual cards are displayed.
ew students to challenge each other. Play the same manner.	
t contestants of equal ability or select which assure some success for all students. ay wish to have one student flash the cards, tudent referee, and one student keep score on halkboard.	
iations of the game:	
remains at the front until defeated by a nger.	
e two or more foods to be named for each .	
fy whether or not the animal is a plant eater, eater, or a plant and animal eater.	
play for as long as interest warrants and/or ts have become familiar with the animals and t.	
is completed, ask:	
VE YOU LEARNED BY PLAYING THIS GAME?	--respond, "About animals," "What animals eat."

MATERIALS	TEACHING STRATEGIES
 Grasses Grain	WHY DO ANIMALS EAT? Summarize the activity by saying: WE NOW KNOW THE NAMES OF SEVERAL ANIMALS THAT LIVE IN THE ENVIRONMENT AND WE KNOW WHAT KINDS OF FOOD THEY USUALLY EAT FOR ENERGY.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
DO ANIMALS EAT? the activity by saying: OW KNOW THE NAMES OF SEVERAL ANIMALS THAT IN THE ENVIRONMENT AND WE KNOW WHAT KINDS OOD THEY USUALLY EAT FOR ENERGY.	Students: --respond, "They need food," "For energy."

UNIT III, CORE C
ACTIVITY 3-16: "Who Eats Whom"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

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10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.
What parts of this activity should be retained when the curriculum is revised?
Page(s) _____:

17. Were any animals on the flashcards unknown by your students?
☐ No ☐ Yes: Which?

18. Did students know what most of the animals on the flashcards ate?
☐ Yes ☐ No: What animals did they have trouble with?

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C
ACTIVITY 3-16: "Who Eats Whom"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.

2. Realize that food can be traced to a plant source.

3. Realize that all food chains begin with a green plant.

4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.

5. Trace a food to its source.

6. Construct food chains and webs.

8. State the sources of food for various organisms.

MATERIALS

TEACHING STRATEGIES

Activity 3-17. The Food Chain Game

This activity gives students the opportunity to build food chains and the teacher an opportunity to assess whether they understand the concept that all food for all animals comes from plants.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

ACTIVITY 3-17. THE FOOD CHAIN GAME

BSCS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
3. Realize that all food chains begin with a green plant.
4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. State the sources of food for various organisms.

TEACHING STRATEGIES

-17. The Food Chain Game

ity gives students the opportunity to build s and the teacher an opportunity to assess y understand the concept that all food for comes from plants.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have played the Food Chain Game.
--have felt successful and enjoyed the game.
--have defended a food chain sequence.
--have defined a food chain as a series of animals that eat other animals or plants for energy.

ACTIVITY 3-17

MATERIALS

1 Deck of animal flash cards
4 Decks of food chain cards

TEACHING STRATEGIES

Teacher Preparation:

1. Have available ample table space for the card game in Part II.

This activity, because of its length, is divided into Part I and Part II. The first part introduces the concept of food chains and that they end in a plant. The second part of the activity consists of a game which gives the students an opportunity to build food chains.

Part I.

Hold up the deck of flash cards and ask:

WHAT DID WE LEARN ABOUT ANIMALS IN OUR LAST ACTIVITY USING THESE CARDS?

Pick out the card depicting the hawk. Ask the students to identify it. Set the card on the left side of the chalk tray. Write the word "hawk" above the card and circle the word.

Ask:

WHO REMEMBERS WHAT THE HAWK EATS?

Hold up the card depicting a snake, set it down on the chalk tray to the right of the hawk, write "snake" on the chalkboard, circle the word and say:

HAWKS DO EAT SNAKES AND OTHER THINGS.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
aration:	
vailable ample table space for the card game t II.	
, because of its length, is divided into art II. The first part introduces the concept ns and that they end in a plant. The second activity consists of a game which gives the opportunity to build food chains.	
deck of flash cards and ask:	
WE LEARN ABOUT ANIMALS IN OUR LAST USING THESE CARDS?	--recall, "What they eat," "That they eat," "Some eat plants," "Some eat animals."
card depicting the hawk. Ask the students t. Set the card on the left side of the Write the word "hawk" above the card and rd.	
MBERS WHAT THE HAWK EATS?	--respond, "Rabbit," "Snake."
ard depicting a snake, set it down on the the right of the hawk, write "snake" on the ircle the word and say:	
EAT SNAKES AND OTHER THINGS.	

MATERIALS

Diagram 3-9

TEACHING STRATEGIES

Draw an arrow from the hawk to the snake. Say:

A HAWK EATS A SNAKE. WHAT DO SNAKES EAT?

Hold up a card depicting a mouse, set it down to the right of the snake, write "mouse" on the chalkboard above the card and circle the word. Say:

ONE OF THE THINGS YOU MENTIONED WAS A MOUSE.

Draw an arrow from the snake to the mouse and say:

A SNAKE MAY EAT A MOUSE. WHAT ABOUT THE MOUSE? WHAT DOES IT EAT?

Continue with the same strategy for what the mouse might eat (insect) and what the insect might eat (grain). Refer to Diagram 3-9 for an example. Point to the entire chain and say:

WE HAVE SEVERAL ANIMALS THAT ARE IMPORTANT TO ONE ANOTHER BECAUSE OF THEIR FOOD. SINCE EACH IS LINKED TO THE NEXT BECAUSE OF WHAT IT USUALLY EATS, WE CALL THIS A FOOD CHAIN.

Write "food chain" on the chalkboard.

If students seem confused about chains or links, use the following strategy. Ask:

WHAT OTHER KINDS OF CHAINS DO YOU KNOW ABOUT?

IS EACH PIECE OR LINK IMPORTANT IN A PAPER CHAIN?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
row from the hawk to the snake. Say:	
K EATS A SNAKE. WHAT DO SNAKES EAT?	--respond, "Frog," "Worms," "Insects," "Mice."
card depicting a mouse, set it down to the he snake, write "mouse" on the chalkboard card and circle the word. Say:	
F THE THINGS YOU MENTIONED WAS A MOUSE.	
row from the snake to the mouse and say:	
KE MAY EAT A MOUSE. WHAT ABOUT THE MOUSE? DOES IT EAT?	--respond, "Grain," "Insects."
ith the same strategy for what the mouse might t) and what the insect might eat (grain). iagram 3-9 for an example. Point to the in and say:	
VE SEVERAL ANIMALS THAT ARE IMPORTANT TO NOTHER BECAUSE OF THEIR FOOD. SINCE ES LINKED TO THE NEXT BECAUSE OF WHAT UALLY EATS, WE CALL THIS A FOOD CHAIN.	
l chain" on the chalkboard.	
seem confused about chains or links, use ing strategy. Ask:	
THER KINDS OF CHAINS DO YOU KNOW ABOUT?	--recall other types of chains, such as paper chains at Christmas and chains for locking up bicycles.
H PIECE OR LINK IMPORTANT IN A PAPER CHAIN?	--visualize a paper chain and respond, "Yes."

MATERIALS

TEACHING STRATEGIES

Follow the strategy outlined above for the mountain lion, deer, and grass chain; the man, steer, and grass chain; and the sheep and grass chain. After writing the word on the chalkboard, select students to draw circles and arrows to show each link in the chain.

Say:

> THERE ARE MANY EXAMPLES OF CHAINS WE CAN DISCUSS BESIDES THESE. ARE ALL OF THE FOOD CHAINS THE SAME LENGTH?
>
> ARE LIVING THINGS IMPORTANT FOR FOOD FOR ALL ANIMALS?
>
> LOOK CAREFULLY AT EACH OF THESE FOOD CHAINS. CAN YOU FIND ONE IMPORTANT THING THAT IS ALIKE IN ALL OF THE CHAINS?

If students fail to perceive that each chain ends with a plant, say:

> LOOK AT THE END OF EACH CHAIN ON THIS SIDE OF THE CHALKBOARD (point to the right side). WHAT IS THE SAME ABOUT EACH OF THESE LIVING THINGS?

Ask:

> IF WE WERE TO BUILD OTHER CHAINS LIKE THESE, WHAT KIND OF LIVING THING WOULD WE EXPECT TO END WITH?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
trategy outlined above for the mountain lion, rass chain; the man, steer, and grass chain; ep and grass chain. After writing the word on ard, select students to draw circles and arrows h link in the chain.	
ARE MANY EXAMPLES OF CHAINS WE CAN DISCUSS S THESE. ARE ALL OF THE FOOD CHAINS THE ENGTH?	--observe and respond, "No."
VING THINGS IMPORTANT FOR FOOD FOR ALL S?	--respond, "Yes."
AREFULLY AT EACH OF THESE FOOD CHAINS. J FIND ONE IMPORTANT THING THAT IS IN ALL OF THE CHAINS?	--respond, "All begin with an animal," "Linked together," "I don't know," "All ends in a plant."
fail to perceive that each chain ends with a	
T THE END OF EACH CHAIN ON THIS SIDE CHALKBOARD (point to the right side). S THE SAME ABOUT EACH OF THESE LIVING ?	--respond, "All end in plants."
WERE TO BUILD OTHER CHAINS LIKE THESE, IND OF LIVING THING WOULD WE EXPECT WITH?	--recall, "Plants."

MATERIALS	TEACHING STRATEGIES
	Have students recall the activity where they traced ingredients of a hamburger to their sources. Say: DO YOU REMEMBER WHAT WE ENDED WITH WHEN WE TRACED THE HAMBURGER AND BUN TO THEIR FOOD SOURCES? NOW LOOK AT OUR FOOD CHAINS. WHAT DO WE END UP WITH IN EVERY FOOD CHAIN? WHAT DO WE END UP WITH IN FOOD SOURCES AND FOOD CHAINS? Make sure this concept is clear before proceeding. Part II. WE'VE BUILT ONLY A FEW FOOD CHAINS. WE CAN BUILD SOME MORE BY PLAYING THE *FOOD CHAIN* GAME. Prepare the students to play by dividing the class into groups of three or four. Distribute a deck of food chain cards to each group. Allow time for them to examine the cards. Point out that this deck differs from the flash cards in that it includes some cards with only plants pictured. Say: THE OBJECT OF THIS GAME IS TO BUILD FOOD CHAINS. YOU WILL DO THIS BY USING THE LIVING THINGS PICTURED ON THE CARDS. THIS GAME IS SIMILAR TO THE RUMMY GAME YOU HAVE PLAYED BEFORE. I'LL EXPLAIN THE RULES AND THEN PLAY THE GAME WITH TWO OF YOU SO WE CAN SEE HOW IT IS PLAYED.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
nts recall the activity where they traced s of a hamburger to their sources. Say:	
OU REMEMBER WHAT WE ENDED WITH WHEN WE ED THE HAMBURGER AND BUN TO THEIR FOOD CES?	--recall hamburger transparency and say, "Plants."
LOOK AT OUR FOOD CHAINS.	
DO WE END UP WITH IN EVERY FOOD CHAIN?	--conclude, "Plants."
DO WE END UP WITH IN FOOD SOURCES AND CHAINS?	--conclude, "Plants."
this concept is clear before proceeding.	
BUILT ONLY A FEW FOOD CHAINS. WE CAN SOME MORE BY PLAYING THE *FOOD CHAIN* GAME.	
e students to play by dividing the class into three or four. Distribute a deck of food chain each group. Allow time for them to examine the int out that this deck differs from the flash hat it includes some cards with only plants	
BJECT OF THIS GAME IS TO BUILD FOOD CHAINS. ILL DO THIS BY USING THE LIVING THINGS RED ON THE CARDS. THIS GAME IS SIMILAR E RUMMY GAME YOU HAVE PLAYED BEFORE. I'LL IN THE RULES AND THEN PLAY THE GAME WITH F YOU SO WE CAN SEE HOW IT IS PLAYED.	

MATERIALS

TEACHING STRATEGIES

The rules of the game are:

1. Decide who will be the first dealer. The player to the left of the dealer plays first.

2. After the cards are shuffled, each player will be dealt four cards.

3. The rest of the cards are placed face down in a pile in the middle of the table. The top card on that pile is turned face up beside the others.

4. Each player looks at the cards in his hand to see if any of his cards form a food chain. One rule to remember is that chains must be complete--they must begin with an animal and end with a plant.

5. If the player has one or more food chains in his hand, he may now lay the cards face up on the table in the correct order, declaring who eats whom as he does so. Lay the cards down so that they form a chain.

6. The player then picks from the face down pile the number of cards he just put down. After restoring his hand to the five cards he began with, he discards one and is back to his original hand of four. Each player has four cards at the beginning of his turn, draws one so that during his turn he has five cards, and discards at the end of this turn (back to four cards).

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
the game are: who will be the first dealer. The player left of the dealer plays first. the cards are shuffled, each player will lt four cards. est of the cards are placed face down in a n the middle of the table. The top card t pile is turned face up beside the others. layer looks at the cards in his hand to see of his cards form a food chain. One rule ember is that chains must be complete-- ust begin with an animal and end with a plant. player has one or more food chains in his he may now lay the cards face up on the in the correct order, declaring who eats s he does so. Lay the cards down so that orm a chain. ayer then picks from the face down pile the of cards he just put down. After restoring nd to the five cards he began with, he discards d is back to his original hand of four. Each has four cards at the beginning of his turn, one so that during his turn he has five cards, scards at the end of this turn (back to four .	

MATERIALS	TEACHING STRATEGIES
	7. Each player takes a turn. Cards drawn are used to form new chains or to add to other chains he has made. For example, a student may lay down cards for a mouse, insect, and grain as a chain. During a later turn, a snake card could be added to the beginning of his chain. 8. Each card in a chain is worth one point. The first person to lay down enough chains so that they have at least ten points is the winner. All food chains must be complete and end with a plant. 9. If any questions arise about what eats what, make it clear that for purposes of the game the eating habits as described on the cards will be the only ones accepted. Now select two or three students and go over the rules again, demonstrating how the game is played. Continue the demonstration only until the game is understood. Then allow the students to play the game as long as it seems appropriate. At the end of the game time, ask how many students won the game at least once. Use the chart in Item 18 of the Feedback Sheet for this activity to list their names. Ask how many won the game twice, three times, and more than three times. Check off their names on the chart as they raise their hands.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
player takes a turn. Cards drawn are used to new chains or to add to other chains he has . For example, a student may lay down cards for use, insect, and grain as a chain. During a r turn, a snake card could be added to the nning of his chain. card in a chain is worth one point. The first on to lay down enough chains so that they have least ten points is the winner. All food chains be complete and end with a plant. ny questions arise about what eats what, make lear that for purposes of the game the eating ts as described on the cards will be the only accepted. two or three students and go over the rules onstrating how the game is played. Continue tration only until the game is understood. the students to play the game as long as it opriate. of the game time, ask how many students won t least once. Use the chart in Item 18 of the heet for this activity to list their names. ny won the game twice, three times, and more times. Check off their names on the chart as their hands.	Students: --observe two or three classmates and the teacher playing the game.

ACTIVITY 3-17

MATERIALS	TEACHING STRATEGIES
	Use this information to regroup your students to play the game the next time. Group the winners together to make the game more challenging for them and allow others an opportunity to win. Give assistance to any that are having difficulty, or assign some of the winners to help them next time. Conclude by saying: FROM PLAYING THIS GAME, WHAT HAVE WE LEARNED ABOUT WHY ANIMALS ARE IMPORTANT TO EACH OTHER? Student responses should indicate interdependency of living things in terms of food.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
nformation to regroup your students to play the next time. Group the winners together to game more challenging for them and allow others unity to win. Give assistance to any that are fficulty, or assign some of the winners to help time.	Students:
y saying:	--demonstrate ability to play the game following the rules described.
PLAYING THIS GAME, WHAT HAVE WE LEARNED WHY ANIMALS ARE IMPORTANT TO EACH OTHER?	--conclude, "Because they eat each other," "They wouldn't have any food without each other," "They'd die," "They wouldn't have any energy."
esponses should indicate interdependency of ngs in terms of food.	

UNIT III, CORE C
ACTIVITY 3-17: "Food Chain Game"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Was any student unsuccessful in playing the food chain game?
☐ No ☐ Yes: Who and why?

18. List the students who won the food chain game on the chart below:

	Students
One win:	
Two wins:	
Three or more wins:	

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

BSCS Evaluation: EMH Feedback Form 1c

UNIT III, CORE C
ACTIVITY 3-17: "Food Chain Game"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE C OBJECTIVES:

4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.

5. Trace a food to its source.

6. Construct food chains and webs.

7. Know that energy flows from one kind of organism to another kind of organism in a food chain.

8. State the sources of food for various organisms.

9. Appreciate the interrelationships of organisms in a food web.

10. Understand the consequences that the removal of an organism has on a food web.

MATERIALS

TEACHING STRATEGIES

Activity 3-18. Construction Of A Food Web

By now students should be familiar with the idea of linear interlinking events in a food chain. In this activity, the interconnecting aspects of one chain to another are developed through the construction of food webs.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

BSCS

ACTIVITY 3-18. CONSTRUCTION OF A FOOD WEB

FOCUS FOR THIS ACTIVITY

ALS:

Realize and appreciate the energy interrelationships between organisms.

Appreciate and understand man's dependence on green plants for food.

OBJECTIVES:

Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.

Trace a food to its source.

Construct food chains and webs.

Know that energy flows from one kind of organism to another kind of organism in a food chain.

State the sources of food for various organisms.

Appreciate the interrelationships of organisms in a food web.

Understand the consequences that the removal of an organism has on a food web.

TEACHING STRATEGIES

-18. Construction Of A Food Web

ents should be familiar with the idea of rlinking events in a food chain. In this he interconnecting aspects of one chain to developed through the construction of food

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have participated in pinning and marking food chains on Worksheets 3-17 and 3-18.
--have predicted that a particular animal can be one link in many different chains.

ACTIVITY 3-18

MATERIALS

1 Deck of animal flash cards
Worksheet 3-17
Worksheet 3-18
*4 Pieces of heavy cardboard at least 8 1/2" X 11" for each pair of students
*Colored chalk
20 Map push pins for each pair of students
*Colored rubber bands, about 25 per pair of students
Slides 3-32 through 3-34
*35mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Collect pieces of heavy cardboard and cut them down to 8 1/2 X 11 inches before class. Two thicknesses of cardboard should be used so that pins will stay in position and not stick through. If cardboard is not available, corkboard or anything else can be used that tacks will go into.

2. Long rubber bands (3 to 4 inches) should be used since they can more easily be stretched. Be sure they are colored.

NOTE: Place the bean plants to be tested during Activity 3-20 in the dark (light-proof container or cupboard) three days prior to beginning that activity.

Begin by saying:

WHAT WAS THE NAME OF THE GAME WE PLAYED (yesterday).

WHAT DID EACH OF YOU TRY TO DO TO WIN THE GAME?

WERE ANY OF THE ANIMALS IN MORE THAN ONE CHAIN?

TEACHING STRATEGIES

ration:

pieces of heavy cardboard and cut them down
2 X 11 inches before class. Two thicknesses
board should be used so that pins will stay
tion and not stick through. If cardboard is
ilable, corkboard or anything else can be
at tacks will go into.

bber bands (3 to 4 inches) should be used
hey can more easily be stretched. Be sure
e colored.

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ty 3-20 in the dark (light-proof container
board) three days prior to beginning that
ty.

ng:

THE NAME OF THE GAME WE PLAYED (yesterday).

EACH OF YOU TRY TO DO TO WIN THE GAME?

OF THE ANIMALS IN MORE THAN ONE CHAIN?

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have recalled that a food chain is a series of animals that eat other animals or plants for energy.
--have defined a food web as many interconnected food chains.
--have demonstrated an understanding of the interdependence of living things in a food web by correctly reporting about Worksheet 3-17 or 3-18.

Students:

--recall, "Food chain game."

--recall, "Make chains," "Make those food things," "Connect foods."

--respond, "Yes," "No," "I don't remember."

MATERIALS	TEACHING STRATEGIES
	Place the flash cards of the hawk, snake, mouse, and grain on the chalk tray in sequence. Draw arrows to show a food chain. Ask: HOW MANY PLANTS OR ANIMALS IS THE HAWK CONNECTED WITH? HOW MANY PLANTS OR ANIMALS IS THE SNAKE CONNECTED WITH? HOW MANY PLANTS OR ANIMALS IS THE MOUSE CONNECTED WITH? HOW MANY PLANTS OR ANIMALS IS THE GRAIN CONNECTED WITH? DOES A HAWK EVER EAT ANYTHING BESIDES SNAKES? WHAT? DOES A SNAKE EVER EAT ANYTHING BESIDES MICE? WHAT? DOES A MOUSE EAT ANYTHING BESIDES GRAIN? WHAT?

INVOLVE
SLOWES
STUDEN

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
flash cards of the hawk, snake, mouse, and grain alk tray in sequence. Draw arrows to show a food	
ANY PLANTS OR ANIMALS IS THE HAWK CTED WITH?	--respond, "One."
INVOLVE YOUR SLOWEST STUDENTS	
ANY PLANTS OR ANIMALS IS THE SNAKE CTED WITH?	--respond, "Two."
ANY PLANTS OR ANIMALS IS THE MOUSE CTED WITH?	--respond, "Two."
ANY PLANTS OR ANIMALS IS THE GRAIN CTED WITH?	--respond, "One."
A HAWK EVER EAT ANYTHING BESIDES S? WHAT?	--recall *Food Chain Game* and respond, "Yes," giving examples.
A SNAKE EVER EAT ANYTHING BESIDES WHAT?	--recall *Food Chain Game* and respond, "Yes," giving examples.
A MOUSE EAT ANYTHING BESIDES GRAIN?	--recall *Food Chain Game* and respond, "Yes," giving examples.

MATERIALS

Slide 3-32

TEACHING STRATEGIES

DO YOU THINK A PLANT OR ANIMAL COULD BE PART OF MORE THAN ONE FOOD CHAIN?

Project Slide 3-32 and say:

LET'S SEE IF WE CAN FIND OUT IF YOUR PREDICTIONS ARE CORRECT.

WHAT ANIMALS AND PLANTS DO YOU SEE PICTURED?

You may wish to point to each as it is named.

GIVE SEV
STUDENTS A
TO RESP

Say:

LET'S START WITH AN ANIMAL AND SEE WHICH OF THE OTHER THINGS PICTURED HERE THE ANIMAL EATS. WITH WHICH ANIMAL DO YOU WANT TO START?

Let students decide on an animal.

Call on a student and ask:

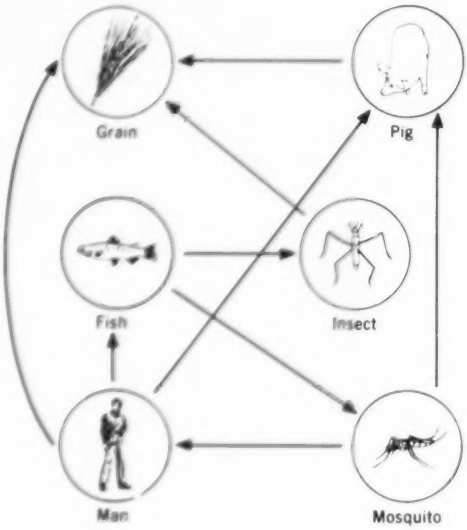
WHICH OF THE THINGS PICTURED HERE DID YOU LEARN THAT A (pig) EATS?

Draw a line on the chalkboard image from the center of the animal to the food that it eats. Use a different color for each animal.

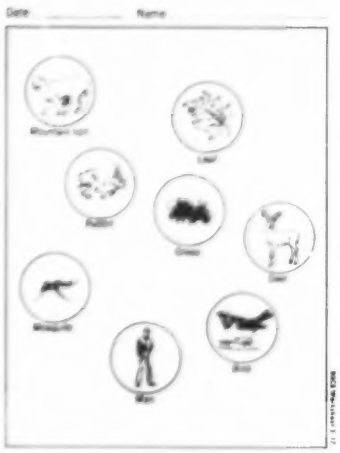
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
•	Students:
THINK A PLANT OR ANIMAL COULD BE PART THAN ONE FOOD CHAIN?	--make predictions.
de 3-32 and say: EE IF WE CAN FIND OUT IF YOUR IONS ARE CORRECT.	
IMALS AND PLANTS DO YOU SEE PICTURED?	--name the organisms pictured.
h to point to each as it is named.	
GIVE SEVERAL STUDENTS A CHANCE TO RESPOND	
TART WITH AN ANIMAL AND SEE WHICH OF ER THINGS PICTURED HERE THE ANIMAL WITH WHICH ANIMAL DO YOU WANT TO START?	--select an animal.
s decide on an animal.	
tudent and ask:	
F THE THINGS PICTURED HERE DID YOU HAT A (pig) EATS?	--name a food normally eaten by the animal selected.
on the chalkboard image from the center of to the food that it eats. Use a different ach animal.	

MATERIALS

Diagram 3-10



Slide 3-33



TEACHING STRATEGIES

Ask:

IS THERE ANYTHING ELSE THIS ANIMAL EATS?

Draw a second line from the center of (pig) to another food that (pigs) eat. Continue in the same manner until lines have been drawn from the animal chosen to all the foods it eats. Begin with another animal and follow the same procedure. Continue until your connections are complete as illustrated in Diagram 3-10.

Divide the class into teams of two. If you anticipate that a particular student might have problems, pair him with a more capable student.

Project Slide 3-33 and have students identify each picture.

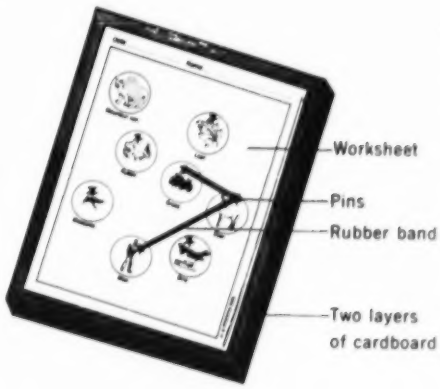
Select students to distribute pieces of cardboard, Worksheets 3-17 and 3-18, rubber bands, and pins to each team. Tell them not to do anything with the materials until directed to do so. Demonstrate what the students are to do while giving the directions below. Refer to Diagram 3-11 as necessary.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
E ANYTHING ELSE THIS ANIMAL EATS?	--name other foods eaten.
nd line from the center of (pig) to another pigs) eat. Continue in the same manner until been drawn from the animal chosen to all the ts. Begin with another animal and follow the ure. Continue until your connections are illustrated in Diagram 3-10.	
class into teams of two. If you anticipate that r student might have problems, pair him with a e student.	
DISTRIBUTE MATERIALS	
de 3-33 and have students identify each	
ents to distribute pieces of cardboard, 3-17 and 3-18, rubber bands, and pins to Tell them not to do anything with the ntil directed to do so. Demonstrate what s are to do while giving the directions below. agram 3-11 as necessary.	
DEMONSTRATE	

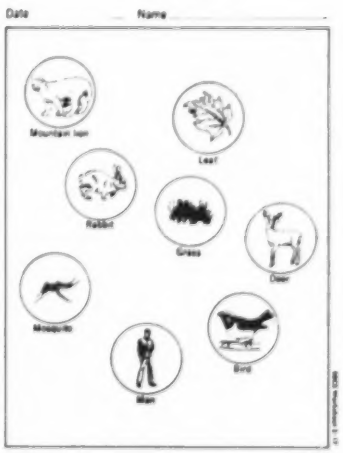
ACTIVITY 3-18

MATERIALS

Diagram 3-11



Slide 3-33



TEACHING STRATEGIES

1. Lay Worksheet 3-17 on top of two sheets of cardboard.

2. Stick a push pin into the center of each picture so the worksheet and the cardboard are stuck together.

3. Pick one animal to start with. Put one end of a rubber band around the pin stuck in that animal picture.

4. Loop the other end of the rubber band around the pin stuck in the center of what that animal eats (e.g., from mountain lion to deer). Have the students do this. Check to see that each team has done it correctly.

5. Instruct the students to do the same thing with all of the animals on their sheets. If necessary, demonstrate one more example on your sheet. Tell them to talk about what an animal eats with their partners and then take turns putting on the rubber bands.

When students have completed Worksheet 3-17, again project Slide 3-33. Call on various teams to tell how and why they completed the worksheets as they did. Refer to Diagram 3-12 for the correct answers.

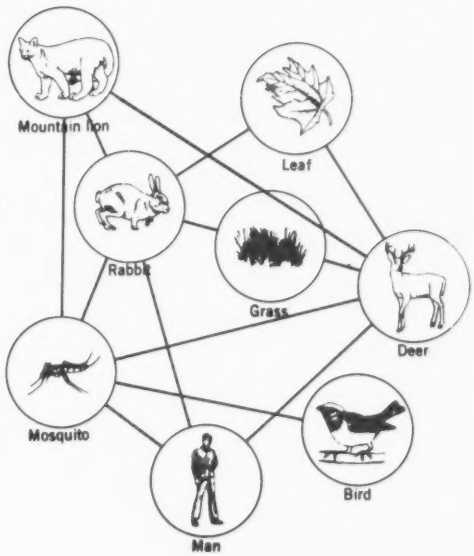
Then ask the following questions to focus on the significance of the rubber bands.

WHAT ARE WE IMAGINING THE RUBBER BANDS SHOW IN EACH OF OUR FOOD CHAINS?

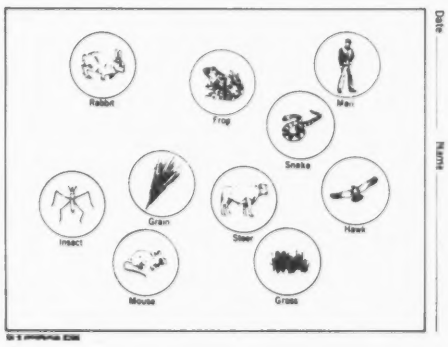
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
Worksheet 3-17 on top of two sheets of Board.	
k a push pin into the center of each picture he worksheet and the cardboard are stuck ther.	
one animal to start with. Put one end of a er band around the pin stuck in that animal ure.	
the other end of the rubber band around the pin k in the center of what that animal eats (e.g., mountain lion to deer). Have the students do Check to see that each team has done it ectly.	
ruct the students to do the same thing with all e animals on their sheets. If necessary, strate one more example on your sheet. Tell to talk about what an animal eats with their ers and then take turns putting on the rubber .	--construct food webs by connecting animals with rubber bands.
ts have completed Worksheet 3-17, again project Call on various teams to tell how and why ted the worksheets as they did. Refer to 2 for the correct answers.	--respond by volunteering their answers.
e following questions to focus on the e of the rubber bands. E WE IMAGINING THE RUBBER BANDS SHOW OF OUR FOOD CHAINS?	--recall that they stand for, "The links from one thing to another."

MATERIALS

Diagram 3-12



Slide 3-34



TEACHING STRATEGIES

Direct attention to a specific link, such as that between the hawk and mouse, and ask:

WHY DID THE (hawk) EAT THE (mouse)?

WHAT DO ANIMALS GET OUT OF FOOD?

TO HOW MANY DIFFERENT ANIMALS COULD THE ENERGY FROM THE (mouse) GO?

WHAT DO THE RUBBER BANDS IN OUR CHAINS SHOW?

Now project Slide 3-34 and have students identify each picture.

Direct students to complete Worksheet 3-18, constructing food chains as before. When students have completed Worksheet 3-18, again project Slide 3-34. Call on various teams to tell how and why they completed the worksheet as they did. Refer to Diagram 3-13 for the correct answers.

Then focus their attention on the significance of the rubber bands as before. Select a specific link, such as the frog and insect, and ask:

WHY DID THE (frog) EAT THE (insect)?

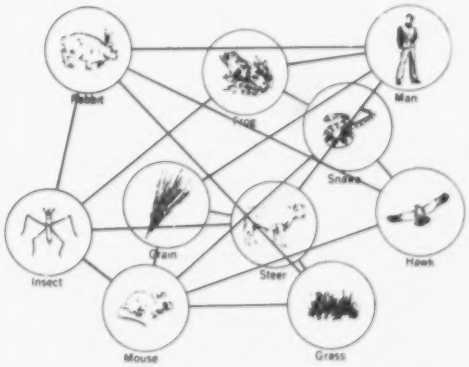
WHAT DO ANIMALS GET OUT OF FOOD?

IN HOW MANY DIFFERENT CHAINS COULD THE ENERGY FROM THE (insect) GO?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
tion to a specific link, such as that between mouse, and ask:	
THE (hawk) EAT THE (mouse)?	--respond, "For food."
ANIMALS GET OUT OF FOOD?	--recall, "Energy."
ANY DIFFERENT ANIMALS COULD THE ROM THE (mouse) GO?	--study the connecting chains to determine the number of chains that the (mouse) could be in.
THE RUBBER BANDS IN OUR CHAINS SHOW?	--infer that the rubber bands represent the pathway of energy and that energy is flowing from organism to organism.
Slide 3-34 and have students identify each	
nts to complete Worksheet 3-18, constructing as before. When students have completed 18, again project Slide 3-34. Call on various l how and why they completed the worksheet as efer to Diagram 3-13 for the correct answers.	--respond by volunteering their answers.
heir attention on the significance of the as before. Select a specific link, such and insect, and ask:	
THE (frog) EAT THE (insect)?	--respond, "For food."
ANIMALS GET OUT OF FOOD?	--recall, "Energy."
ANY DIFFERENT CHAINS COULD THE ENERGY (insect) GO?	--study the connecting chains to determine the number of chains that the (insect) could be in.

MATERIALS

Diagram 3-13



TEACHING STRATEGIES

WHAT DO THE RUBBER BANDS IN OUR CHAINS SHOW?

Hold up one of the student boards with completed chains and ask:

WHAT DOES THE BOARD WITH THE CONNECTED FOOD CHAINS LOOK LIKE?

ACCEPT ALL ANSWERS

If students do not suggest calling it a food web, tell them:

FOOD CHAINS WHICH ARE CONNECTED ARE CALLED A FOOD WEB. WHY DO YOU THINK FOOD CHAINS ARE CALLED A FOOD WEB?

Write "food web" on the chalkboard.

HOW IS A FOOD WEB DIFFERENT FROM A FOOD CHAIN?

Emphasize to students that in a web each living thing might have several paths of food energy, whereas in a chain there is only one path.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
THE RUBBER BANDS IN OUR CHAINS SHOW?	--infer that the rubber bands represent the pathway of energy and that energy is flowing from organism to organism.
of the student boards with completed chains	
S THE BOARD WITH THE CONNECTED FOOD OOK LIKE?	--respond, "Chart," "Web," "Tangle," "A mess."
ACCEPT ALL ANSWERS	
do not suggest calling it a food web, tell	
INS WHICH ARE CONNECTED ARE CALLED EB. WHY DO YOU THINK FOOD CHAINS ED A FOOD WEB?	--propose various reasons, such as a tangle of interconnecting, weblike pathways for a food web; may suggest likeness to a spider web.
web" on the chalkboard.	
FOOD WEB DIFFERENT FROM A FOOD CHAIN?	--compare the two and indicate that a food chain shows only one path of food energy from plants. A food web is a network of chains with each link connected to many others.
students that in a web each living thing everal paths of food energy, whereas in a is only one path.	

MATERIALS	TEACHING STRATEGIES
	Now ask: COULD A MOUNTAIN LION LIVE IN ITS FOREST ENVIRONMENT WITHOUT ANY OTHER ANIMALS? If students do not indicate a reason, ask: WHY CAN'T THE MOUNTAIN LION LIVE ALONE? HOW ABOUT A MOSQUITO? COULD IT LIVE WITHOUT OTHER ANIMALS IN ITS ENVIRONMENT? WOULD A COW GET ALONG WITHOUT THE OTHER ANIMALS PICTURED? WOULD THE COW SURVIVE WITHOUT ANY OTHER LIVING THINGS IN ITS ENVIRONMENT? It is important that students recognize the interdependence of organisms within the food web. Removal of any organism in the web affects other organisms, and in some cases would have disastrous effects on other populations. For example, if the mouse population were destroyed, the hawks would have to find an alternate source of food, leave the area, or starve. Similarly, if all the hawks were killed, the mouse population might grow too large and consume grass which was being used by cows. Fewer cows could then be raised on the area, which would provide less food for organisms eating cow, etc.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
A MOUNTAIN LION LIVE IN ITS FOREST ONMENT WITHOUT ANY OTHER ANIMALS?	--respond, "No, it wouldn't have any food."
s do not indicate a reason, ask:	
AN'T THE MOUNTAIN LION LIVE ALONE?	--recall game and worksheet and say, "He needs deer and rabbits for food," "He wouldn't have anything to eat," "He needs food for energy."
BOUT A MOSQUITO? COULD IT LIVE WITHOUT ANIMALS IN ITS ENVIRONMENT?	--recall game and worksheet, remembering that a mosquito needs blood and that blood comes from animals, therefore the mosquito couldn't live without animals.
A COW GET ALONG WITHOUT THE OTHER LS PICTURED?	--respond, "Yes." Refer to food web board and realize that a cow would eat grain and grass for energy.
THE COW SURVIVE WITHOUT ANY OTHER THINGS IN ITS ENVIRONMENT?	--recognize that grass and grain are living things and that cows wouldn't live without them.
rtant that students recognize the interdepend- ganisms within the food web. Removal of any the web affects other organisms, and in some have disastrous effects on other populations. e, if the mouse population were destroyed, the have to find an alternate source of food, leave or starve. Similarly, if all the hawks were mouse population might grow too large and ass which was being used by cows. Fewer cows be raised on the area, which would provide less rganisms eating cow, etc.	

MATERIALS

TEACHING STRATEGIES

Select an organism in the food web which has several rubber bands leading from it and ask:

WHAT WOULD HAPPEN TO THE FOOD WEB IF ALL OF THE (mosquitoes) WERE KILLED?

Set the web board with Worksheet 3-17 on it so that it rests in a vertical position, or hold it vertically in front of you. Remove the mosquito pin so that all rubber bands connected to it pop off and hang down. If the pin has become tangled in the rubber bands, twist it so the bands slip off.

Ask:

WHAT HAS HAPPENED TO OUR FOOD WEB?

Explain to the students that whenever a link in a food web is removed, other living things are affected and the job of food-getting becomes more difficult.

Ask:

IF MOST OF THE (mosquitoes) IN THIS FOOD WEB WERE KILLED, HOW WOULD THE OTHER LIVING THINGS BE AFFECTED? HOW WOULD IT CHANGE THINGS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
anism in the food web which has several leading from it and ask: D HAPPEN TO THE FOOD WEB IF ALL OF uitoes) WERE KILLED?	--recognize and respond that removal of an organism would remove the food supply for other organisms in the web, and that other animals might die or have to find something else to eat.
oard with Worksheet 3-17 on it so that it rtical position, or hold it vertically in Remove the mosquito pin so that all rubber ed to it pop off and hang down. If the pin ngled in the rubber bands, twist it so the f. HAPPENED TO OUR FOOD WEB? e students that whenever a link in a food d, other living things are affected and the etting becomes more difficult.	--recognize that it has been broken.
F THE (mosquitoes) IN THIS FOOD WEB ED, HOW WOULD THE OTHER LIVING THINGS ED? HOW WOULD IT CHANGE THINGS?	--respond to indicate that the other living things would have to eat more of another kind of living thing, that it would be more difficult to get food, that some of the other living things might die because there was not enough food, etc.

MATERIALS	TEACHING STRATEGIES
	To culminate this activity and assess student understanding of the interdependence of living things in a food web, follow this strategy. Have Tallysheet 3-9 available to fill out as students take a turn. Say: YOU ARE EACH GOING TO HAVE A TURN PULLING A PIN FROM ONE OF THE LIVING THINGS IN ONE OF THE FOOD WEBS YOU HAVE MADE. WE WILL GO ONE AT A TIME AND LISTEN CAREFULLY TO EACH OTHER. DO NOT SELECT A PICTURE THAT SOMEONE HAS ALREADY CHOSEN. Again focus the students' attention on Worksheet 3-17. Start with the first student on your class roster and say: (Student's name), PULL A PIN FROM ONE OF THE LIVING THINGS ON YOUR FOOD WEB. Ask: WHAT LIVING THING DID YOU CHOOSE? WHEN THAT LIVING THING WAS REMOVED OR DIED, DID IT AFFECT THE FOOD WEB? WHAT ARE ALL THE THINGS THAT MIGHT HAPPEN BECAUSE (name of living thing) IS GONE? Call on each student on your roster in turn. Ask the same sequence of questions and make the appropriate rating on the tallysheet. When each picture on Worksheet 3-17 has been used, continue the strategy with Worksheet 3-18.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
te this activity and assess student under- f the interdependence of living things in a follow this strategy. Have Tallysheet 3-9 to fill out as students take a turn.	
RE EACH GOING TO HAVE A TURN PULLING A ROM ONE OF THE LIVING THINGS IN ONE OF OOD WEBS YOU HAVE MADE. WE WILL GO ONE TIME AND LISTEN CAREFULLY TO EACH OTHER. T SELECT A PICTURE THAT SOMEONE HAS DY CHOSEN.	
s the students' attention on Worksheet 3-17.	
the first student on your class roster and	
ent's name), PULL A PIN FROM ONE OF IVING THINGS ON YOUR FOOD WEB.	--respond by pulling a pin from the food web.
LIVING THING DID YOU CHOOSE?	--state which living thing was chosen.
THAT LIVING THING WAS REMOVED OR DIED, T AFFECT THE FOOD WEB?	--respond, "Yes," or "No."
ARE ALL THE THINGS THAT MIGHT HAPPEN SE (name of living thing) IS GONE?	--respond by telling how the web was affected, reflecting the interdependence of living things in the web.
ch student on your roster in turn. Ask the same f questions and make the appropriate rating on heet. When each picture on Worksheet 3-17 has continue the strategy with Worksheet 3-18.	

Teacher _____

Date _____

UNIT III, CORE C
TALLYSHEET 3-9: Clues to Success
ACTIVITY 3-18: "Construction Of A Food Web"

1. Call each student one at a time to the front of the room to remove a pin from his food web board. Ask: WHAT DID YOU REMOVE FROM THE FOOD WEB? Then ask: DOES REMOVING _____ MAKE ANY DIFFERENCE FOR THE REST OF THE THINGS IN THE FOOD WEB? If the student says no, circle no in column 1 below. Then ask: WHAT WILL HAPPEN TO ALL THE LIVING THINGS THAT WERE CONNECTED TO _____? Score as in #2 below. If the student says yes, ask:

2. WHAT ARE ALL THE THINGS THAT MIGHT HAPPEN TO THE FOOD WEB NOW THAT THE _____ IS GONE? In column 2, circle each category of response listed below:
   0 = no response or no reasonable answer
   1 = appropriate animals would starve or die
   2 = appropriate living things would decrease in number
   3 = appropriate living things would increase in number
   4 = appropriate living things would have to eat other things (optional: which might make them scarce as a food source)
   5 = appropriate animals would move to another area.
   Other = briefly write any other idea mentioned that seems reasonable
   If students have only mentioned one or two possible happenings, discuss others with them when you pull a pin after they are done.

		1	2	Other Responses
Attach ID list here.	01	yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____
		yes no	0 1 2 3 4 5	_____

might make them scarce as a food source)
5 = appropriate animals would move to another area.
Other = briefly write any other idea mentioned that seems reasonable
If students have only mentioned one or two possible happenings, discuss others with them when you pull a pin after they are done.

		1	2	Other Responses
Attach ID list here.	01	yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	
		yes no	0 1 2 3 4 5	

UNIT III, CORE C

ACTIVITY 3-18: "Construction Of A Food Web"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Please complete Tallysheet 3-9 and send in with this feedback form.

18. Be sure you have placed the bean plants in the dark in preparation for Activity 3-20.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C

ACTIVITY 3-18: "Construction Of A Food Web"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

CORE C OBJECTIVES:

3. Realize that all food chains begin with a green plant.

9. Appreciate the interrelationships of organisms in a food web.

10. Understand the consequences that the removal of an organism has on a food web.

MATERIALS

TEACHING STRATEGIES

Activity 3-19. Nature's Delicate Balance--Review Of Success

This review of success is divided into two parts. In the first part, students answer two questions on a worksheet to show their understanding of food chains and food webs. Following discussion of these questions, students participate in creating a story for a booklet of pictures about nature's delicate balance. Use this activity to help students understand how much they have learned in the preceding activities.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

BSCS

ACTIVITY 3-19. NATURE'S DELICATE BALANCE--REVIEW OF SUCCESS

OCUS FOR THIS ACTIVITY

OALS:

. Realize and appreciate the energy interrelationships between organisms.

OBJECTIVES:

. Realize that all food chains begin with a green plant.

. Appreciate the interrelationships of organisms in a food web.

. Understand the consequences that the removal of an organism has on a food web.

TEACHING STRATEGIES

19. Nature's Delicate Balance--Review Of Success

of success is divided into two parts. In the students answer two questions on a worksheet ir understanding of food chains and food webs. iscussion of these questions, students in creating a story for a booklet of pictures e's delicate balance. Use this activity to ts understand how much they have learned in ng activities.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

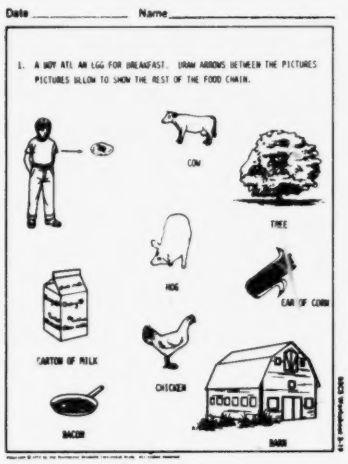
--have answered and discussed the two questions on Worksheet 3-19.
--have identified the illustrations in the pamphlet.
--have participated in creating a story to accompany the illustrations in the pamphlet.
--have identified food chains and webs in the pamphlet.
--have demonstrated an understanding of the interdependence of living things in a food web by participating in class discussions and diagramming at the chalkboard.

ACTIVITY 3-19

MATERIALS

Worksheet 3-19
Slides 3-35 and 3-36
***35mm Slide projector**
Booklet (*Nature's Delicate Balance*)

Slide 3-35



***Not furnished in materials kit**

TEACHING STRATEGIES

Part I.

Distribute Worksheet 3-19 and have each student put his name on it. Tell the students that each should answer the two questions for himself as they are read aloud, and then all of them can discuss the questions together

Project each question separately. Read the questions aloud and allow ample time for the students to mark their worksheets.

After students have answered both questions, collect the worksheets. Then project each slide and discuss their answers. Have them defend their choices. If students are confused, allow more practice with the food web boards. Then proceed with the next part. After class, tally student responses on Tallysheet 3-10.

Part II.

Begin by having students recall the previous activity of constructing food webs.

Then ask:

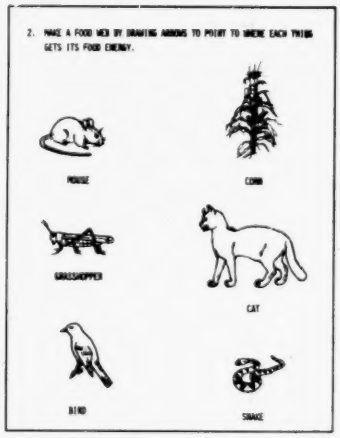
WHAT DID THE RUBBER BANDS SHOW?

WHAT DID WE SHOW WHEN WE EACH PULLED A PIN FROM THE CARDBOARD?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
Worksheet 3-19 and have each student put his . Tell the students that each should answer estions for himself as they are read aloud, and f them can discuss the questions together.	
ch question separately. Read the questions allow ample time for the students to mark their .	
ents have answered both questions, collect the . Then project each slide and discuss their Have them defend their choices. If students ed, allow more practice with the food web hen proceed with the next part. After class, ent responses on Tallysheet 3-10.	
aving students recall the previous activity of ng food webs.	
DID THE RUBBER BANDS SHOW?	--respond, "Which animal eats what," "Where the animals get their food energy," etc.
DID WE SHOW WHEN WE EACH PULLED A PIN THE CARDBOARD?	--respond, "An animal died," "The other animals had to get their food somewhere else," "That there wasn't enough food," or any response which shows an understanding of the interdependence of living things.

MATERIALS

Slide 3-36



TEACHING STRATEGIES

Say:

TODAY YOU WILL EACH GET A BOOKLET, BUT YOU WILL NOTICE SOMETHING ABOUT IT THAT IS DIFFERENT FROM MANY BOOKLETS.

Have a student distribute the booklets.

WHEN YOU GET YOUR BOOKLET, LOOK AT EACH PAGE AND SEE IF YOU CAN DISCOVER HOW IT IS DIFFERENT FROM OTHERS YOU HAVE SEEN.

Then ask:

WHAT DO YOU SEE THAT MAKES THESE BOOKLETS DIFFERENT FROM OTHERS YOU HAVE SEEN?

ACCEPT AL ANSWERS

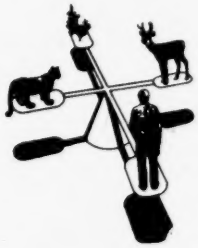
LOOK CAREFULLY AGAIN AT EACH PAGE AND TRY TO FIGURE OUT WHAT IS HAPPENING IN EACH PICTURE.

GIVE STUDE TIME TO THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
U WILL EACH GET A BOOKLET, BUT NOTICE SOMETHING ABOUT IT THAT RENT FROM MANY BOOKLETS.	
nt distribute the booklets.	
GET YOUR BOOKLET, LOOK AT EACH SEE IF YOU CAN DISCOVER HOW IT RENT FROM OTHERS YOU HAVE SEEN.	--look through their booklets.
YOU SEE THAT MAKES THESE BOOKLETS T FROM OTHERS YOU HAVE SEEN?	--remark that there are no words to the story.
ACCEPT ALL ANSWERS	
EFULLY AGAIN AT EACH PAGE AND IGURE OUT WHAT IS HAPPENING IN TURE.	
GIVE STUDENTS TIME TO THINK	

MATERIALS

Biological Sciences Curriculum Study



TEACHING STRATEGIES

Now go through the booklet page by page, eliciting many ideas and descriptions of what students see on each page. The sequence of questions below will help to guide the discussion. Help students develop their ideas, observe, describe, and verbalize.

Begin with the cover, asking students what they observe. If students do not point out the blank lines, tell them that they are going to be making up their own title at the end of class.

Page 1:	WHAT KIND OF ENVIRONMENT DO YOU SEE? WHAT KINDS OF SOUNDS MIGHT YOU HEAR? WHAT NAME COULD WE GIVE THE BOY?
Page 4:	WHAT IS (boy's name) THINKING IN THE FIRST PICTURE? IN THE SECOND PICTURE?
Pages 5-7:	DO YOU THINK THIS COULD HAPPEN? HAVE YOU EVER MADE FRIENDS WITH AN ANIMAL?
Page 8:	WHAT DO YOU SUPPOSE THE FATHER IS TELLING (boy's name) AND THE MOTHER? WHAT COULD BE DONE TO PREVENT THIS FROM HAPPENING? WHERE WAS THE MOUNTAIN LION GETTING HIS FOOD ENERGY? WHO ELSE GETS ENERGY FROM COWS? WHY WERE THE MOUNTAIN LIONS EATING THE COWS INSTEAD OF DEER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ough the booklet page by page, eliciting many descriptions of what students see on each page. ce of questions below will help to guide the . Help students develop their ideas, observe, and verbalize. the cover, asking students what they observe. s do not point out the blank lines, tell them are going to be making up their own title at class. WHAT KIND OF ENVIRONMENT DO YOU SEE? WHAT KINDS OF SOUNDS MIGHT YOU HEAR? WHAT NAME COULD WE GIVE THE BOY? WHAT IS (boy's name) THINKING IN THE FIRST PICTURE? IN THE SECOND PICTURE? 7: DO YOU THINK THIS COULD HAPPEN? HAVE YOU EVER MADE FRIENDS WITH AN ANIMAL? WHAT DO YOU SUPPOSE THE FATHER IS TELLING (boy's name) AND THE MOTHER? WHAT COULD BE DONE TO PREVENT THIS FROM HAPPENING? WHERE WAS THE MOUNTAIN LION GETTING HIS FOOD ENERGY? WHO ELSE GETS ENERGY FROM COWS? WHY WERE THE MOUNTAIN LIONS EATING THE COWS INSTEAD OF DEER?	

MATERIALS	TEACHING STRATEGIES
	Pages 9-10: WHAT DID THE MEN DECIDE TO DO? WHAT WILL HAPPEN TO THE FOOD CHAIN? HOW ELSE COULD THE RANCHERS HAVE STOPPED THE LIONS FROM KILLING THEIR COWS?
	Page 11: DID IT HELP TO SOLVE THE PROBLEM?
	Page 12: HOW MUCH TIME HAS PASSED?
	Page 13: WHY DID (boy's name) KEEP SEEING MORE DEER EACH TIME HE WENT INTO THE FOREST?
	Page 14: WHY DID SO MANY DEER DIE? WHAT HAPPENED TO THE FOOD CHAIN? WOULDN'T THE DEER HAVE DIED SOMETIME ANYWAY? IF OTHER PEOPLE NOTICED THAT THE DEER WERE INCREASING, WHAT COULD HAVE BEEN DONE TO PREVENT THE DEATH OF SO MANY DEER?
	Page 15: WHY DID MORE LEAVES DISAPPEAR FROM THE TREES? WHY IS THE GRASS SO SHORT? WHERE DO THE DEER GET THEIR FOOD ENERGY?
	Page 16: WHICH DEER IS THIS? HOW DO YOU THINK (boy's name) FELT? HOW WOULD YOU FEEL? PEOPLE GO HUNTING ALL THE TIME. WHY WAS IT SO BAD FOR THE RANCHERS TO KILL THE LIONS?
	Page 17: WHAT IS (boy's name) ASKING HIS DAD? WHY DID SO MANY DEER DIE?

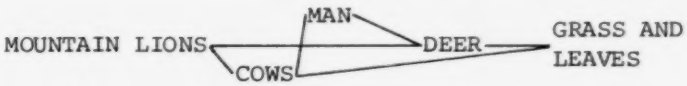
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
D: WHAT DID THE MEN DECIDE TO DO? WHAT WILL HAPPEN TO THE FOOD CHAIN? HOW ELSE COULD THE RANCHERS HAVE STOPPED THE LIONS FROM KILLING THEIR COWS? DID IT HELP TO SOLVE THE PROBLEM? HOW MUCH TIME HAS PASSED? WHY DID (boy's name) KEEP SEEING MORE DEER EACH TIME HE WENT INTO THE FOREST? WHY DID SO MANY DEER DIE? WHAT HAPPENED TO THE FOOD CHAIN? WOULDN'T THE DEER HAVE DIED SOMETIME ANYWAY? IF OTHER PEOPLE NOTICED THAT THE DEER WERE INCREASING, WHAT COULD HAVE BEEN DONE TO PREVENT THE DEATH OF SO MANY DEER? WHY DID MORE LEAVES DISAPPEAR FROM THE TREES? WHY IS THE GRASS SO SHORT? WHERE DO THE DEER GET THEIR FOOD ENERGY? WHICH DEER IS THIS? HOW DO YOU THINK (boy's name) FELT? HOW WOULD YOU FEEL? PEOPLE GO HUNTING ALL THE TIME. WHY WAS IT SO BAD FOR THE RANCHERS TO KILL THE LIONS? WHAT IS (boy's name) ASKING HIS DAD? WHY DID SO MANY DEER DIE?	

MATERIALS

TEACHING STRATEGIES

Have students tell you the names of the living things in the story. Write them on the chalkboard:

"mountain lion, man, cow, deer, grass, and shrubs."



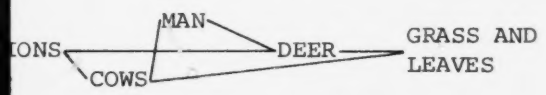
Have students think of the food chains and webs. Select students to draw in lines to illustrate these relationships and tell their classmates what the lines show. Then select students to come up and erase the living things as they were killed or died. Encourage them to verbalize the interrelationships of the living things in the food web.

Conclude the activity by having students suggest titles for the story. Remind them that the title should be based on the main ideas they have discussed in the story. If necessary, review the main ideas. Allow each student to make up his own title and write it on his pamphlet. Assist with spelling as necessary.

Outlined below is one version of the story depicted in the pamphlet. There are variations which the students may develop, but this version offers the story flow and concepts which should be included.

THE BALANCE OF NATURE

There was once a boy, about your age, who lived on a ranch at the edge of a forest. When he was done with his chores each day, one thing he enjoyed doing was walking through the forest.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ts tell you the names of the living things in Write them on the chalkboard: n lion, man, cow, deer, grass, and shrubs."  ts think of the food chains and webs. Select draw in lines to illustrate these relation- ell their classmates what the lines show. Then ents to come up and erase the living things as illed or died. Encourage them to verbalize the onships of the living things in the food web. e activity by having students suggest titles ry. Remind them that the title should be e main ideas they have discussed in the story. y, review the main ideas. Allow each student his own title and write it on his pamphlet. spelling as necessary. low is one version of the story depicted in t. There are variations which the students , but this version offers the story flow and ich should be included. THE BALANCE OF NATURE was once a boy, about your age, who lived anch at the edge of a forest. When he was ith his chores each day, one thing he d doing was walking through the forest.	

MATERIALS

TEACHING STRATEGIES

He enjoyed this particular forest because it was full of plants and animals and very beautiful. He enjoyed looking for new things and hearing new sounds. One day as he was strolling through the forest, he saw the carcass of a deer. At first he was rather disturbed that any person or any animal would want to kill a deer. But then he thought of the many mountain lions that had to hunt food for their cubs to eat. When he realized that the deer was killed so that some other animal would have food, he felt much better.

As he continued his walk, he suddenly noticed a beautiful white-tailed deer peering from behind a tree. But as soon as the deer realized the boy was watching it, it quickly ran away. About a week later when the boy was again walking in the forest, he saw what looked like the same deer. But this time the deer stayed a little longer before dashing away. It was almost as if he recognized the boy and wasn't quite so afraid of him.

A week later, while the boy was walking through the forest, he saw the deer again. This time the boy kept walking closer and closer to the deer. He was very surprised when the deer allowed him to touch it ever so slightly before it ran away. That evening when the boy came home he walked in the door to find his father very upset about something. His father was explaining to his mother that the livestock of neighboring ranchers had been killed by mountain lions from the forest. When the boy woke up the next morning he heard from his father that a group of ranchers had taken their guns and gone on a hunting party looking for mountain lions to kill.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
oyed this particular forest because it ll of plants and animals and very beautiful. oyed looking for new things and hearing unds. One day as he was strolling through rest, he saw the carcass of a deer. At he was rather disturbed that any person animal would want to kill a deer. But e thought of the many mountain lions ad to hunt food for their cubs to eat. e realized that the deer was killed so ome other animal would have food, he uch better. continued his walk, he suddenly noticed tiful white-tailed deer peering from a tree. But as soon as the deer realized y was watching it, it quickly ran away. a week later when the boy was again g in the forest, he saw what looked like me deer. But this time the deer stayed le longer before dashing away. It was as if he recognized the boy and wasn't so afraid of him. later, while the boy was walking through rest, he saw the deer again. This time y kept walking closer and closer to the He was very surprised when the deer d him to touch it ever so slightly before away. That evening when the boy came e walked in the door to find his father pset about something. His father was ning to his mother that the livestock of oring ranchers had been killed by mountain from the forest. When the boy woke up the orning he heard from his father that a group chers had taken their guns and gone on a g party looking for mountain lions to kill.	

ACTIVITY 3-19

MATERIALS

TEACHING STRATEGIES

Later that day the boy saw the ranchers coming out of the forest dragging many dead lions behind them. The ranchers were now very happy because no more of their livestock had been killed by the lions.

Winter passed and spring came. As the snows melted and the weather became warmer, the boy began his walks in the forest again. This time when he walked, he noticed a great number of deer around, many more than he had seen the year before. Another thing he noticed was that there didn't seem to be as much underbrush as the year before. The branches from the trees had the bottom leaves stripped from them. This spring he saw no deer that had been killed by mountain lions.

Later in the summer the boy began to notice that the deer he saw looked very skinny. He could even see their bones sticking out. When he came to the open meadows in the forest the grasses were chewed down so low that more dirt than grass was showing.

Fall came and the boy started school again and continued through the winter. When spring finally came again he was very anxious to get out into the forest.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
that day the boy saw the ranchers coming the forest dragging many dead lions them. The ranchers were now very happy se no more of their livestock had been by the lions. passed and spring came. As the snows and the weather became warmer, the boy his walks in the forest again. This time e walked, he noticed a great number of round, many more than he had seen the efore. Another thing he noticed was that didn't seem to be as much underbrush as ar before. The branches from the trees e bottom leaves stripped from them. This he saw no deer that had been killed by in lions. in the summer the boy began to notice that er he saw looked very skinny. He could see their bones sticking out. When he came open meadows in the forest the grasses hewed down so low that more dirt than grass owing. came and the boy started school again and ued through the winter. When spring finally gain he was very anxious to get out into rest.	

MATERIALS

TEACHING STRATEGIES

What he saw did not make him happy at all. He did not see any live deer but only carcasses of deer. New buds on the trees were already nipped off and the forest was strangely quiet. The boy began looking for the one deer that had always allowed him to come close. He continued walking through the forest searching for his deer but when he found the deer he was very sad. His friend, the deer, had also died. He started home slowly. When he arrived, he asked his father why all this had happened. Why did so many of the deer die?

Extension of this activity:

1. Each student may write his own story to accompany the pictures in the pamphlet.

2. The students may help to develop a class story to accompany the pictures in the pamphlet. You may then write the story on an experience chart to develop language arts activities or type and duplicate it for each student.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
saw did not make him happy at all. He see any live deer but only carcasses of New buds on the trees were already nipped the forest was strangely quiet. The an looking for the one deer that had allowed him to come close. He continued through the forest searching for his when he found the deer he was very sad. end, the deer, had also died. He started owly. When he arrived, he asked his why all this had happened. Why did so the deer die? this activity: student may write his own story to any the pictures in the pamphlet. udents may help to develop a class to accompany the pictures in the pamphlet. y then write the story on an experience to develop language arts activities or nd duplicate it for each student.	

Teacher _____

Date _____

UNIT III, CORE C
TALLYSHEET 3-10: Tally of Worksheet 3-19
ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)

Tally each student's responses to the two questions as indicated below.

Question 1: In column 1 check yes if the following complete food chain is made, with arrows pointing in the appropriate direction: boy → egg → hen → corn.
If chain is correct except for direction of arrows, check ← .
If chain is incorrect, check no and complete column 2 showing the arrows drawn by the student.

Question 2. See back of tallysheet.

	1 (chain)			2 (incorrect chain)									
Attach ID list here.	yes	←	no	boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
01				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn
				boy	egg	hen	corn	cow	hog	tree	milk	bacon	barn

01				boy egg hen corn cow hog tree milk bacon barn
				boy egg hen corn cow hog tree milk bacon barn
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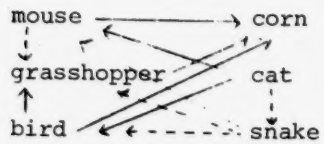
TOTALS: ___ ___ ___

TALLYSHEET 3-10: Tally of Worksheet 3-19

Question 2: Make a check in the appropriate column for each arrow correctly drawn in the correct direction. If another arrow was drawn from the animal than those shown, name the thing to which it points. There are eleven possible arrows as shown but one arrow from each of the five animals to an acceptable food would be an excellent response.



Dotted lines indicate less likely, but possible connections.

This item calls on knowledge of what things eat, an understanding of food chains, and an understanding that some things can be part of many food chains. Any student that draws more than three correct arrows had learned a good deal.

When the questions have been discussed and lines are drawn in on the projected slide on the chalkboard, ask: WHAT DOES EVERYTHING IN THE FOOD WEB DEPEND ON?

	Mouse	to	Grass-hopper	to	Bird	to	Cat	to	Snake	to
	Corn or Grass-hopper	Other	Corn	Other	Grass-hopper or corn	Other	Mouse, Bird or Snake	Other	Mouse, Grass-hopper or Bird	Other
Attach ID list here. 01										

	Mouse	to	Grass-hopper	to	Bird	to	Cat	to	Snake	to
	Corn or Grass-hopper	Other	Corn	Other	Grass-hopper or corn	Other	Mouse, Bird or Snake	Other	Mouse, Grass-hopper or Bird	Other
Attach ID list here. 01										
TOTAL CORRECT RESPONSES:	____		____		____		____		____	

Does this review give an accurate indication of student understanding? ☐ Yes ☐ No

If not, what other evidence do you have of student learning?

UNIT III, CORE C

ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

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11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did any student give away the answer to either question on Worksheet 3-19?
☐ No ☐ Yes: Comment.

18. Did any students have difficulty creating a story for the booklet?
☐ No ☐ Yes: Comment.

19. Please complete Tallysheet 3-10 and send in with this feedback form.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C

ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

UNIT III
REACTIONS TO CORE C

1. Was the background information for this core adequate? ☐ Yes ☐ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name First

W = white
B = black
S = Spanish-American
O = other

W = WISC
B = Binet
O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

roup	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

e
k
ish-
ican
r

W = WISC
B = Binet
O = other
(name)

SIDE B

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONM

CORE D. FOOD MAKING IN PLANTS

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the ener
2. Appreciate and understand man's

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1. Determine that plants contain fo
2. Conclude that plants can make th prevail.
3. Infer that the sun provides the
4. Determine that in the absence o
5. Determine that without air, pla
6. Determine that in the absence o to make food.
7. Appreciate the role of green pl living world.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

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UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE D

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

3. Infer that the sun provides the energy upon which man and other life depends.

4. Determine that in the absence of light, plants are unable to make food.

5. Determine that without air, plants are unable to make food.

6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

Me and my Environment

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

CORE D RATIONALE

Most green plants do not capture and eat animals or other plants for food. Yet, as a living organism, a plant requires food. Where, then, does a plant obtain its food? Over 300 years ago a scientist, Jean Baptiste van Helmont, asked the same question in a classical experiment (which the students consider briefly). Van Helmont concluded that a tree growing in a tub of soil did not "eat" or use any of the soil. Scientists have learned quite a bit since van Helmont's time. We now know that green plants make their own food, mainly from air, water, and light.

Green plants are the primary food makers of the living world. They are able to utilize sunlight for manufacturing food, which can in turn be utilized by animals that feed on the plants. The process of utilizing sunlight for manufacturing food is called photosynthesis. Photosynthesis is the only way that energy is made available for life on the Earth. Without green plants, life as we know it would disappear from our planet.

It is the purpose of this core to focus the attention of the students on this interaction between green plants and their environment. There are several things in the environment that influence the process of photosynthesis in plants. The main product of photosynthesis is sugar, which is almost immediately converted to starch. It is this starch that supplies the plant, and organisms feeding on plants, with energy.

We can list the things from the environment we think are necessary for plant life and then proceed to determine if they are indeed necessary in the food-making process. Attention at the beginning of the core is focused on a chart picturing a living plant. Surrounding the plant are five incomplete areas identifying those factors which might be considered important in the food-making process: soil, air, light,

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UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

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BACKGROUND INFORMATION FOR THE TEACHER

The process of food manufacturing by plants is extremely important to the living world. It is about the only process whereby both energy and food materials are made available to living things. After establishing that plants, as living things, need food for energy in Activity 3-20 (Hungry Plants), the remainder of the activities in Core D are concerned directly or indirectly with the very general requirements of the food-making process.

At one time man thought that plants obtained their food already made from the soil. After much observation and experimentation, such as the classic experiment of van Helmont that is briefly mentioned in Activity 3-20, it was eventually recognized that plants, unlike animals, must manufacture their food. The soil serves primarily as a place for a plant to grow. It anchors the plant. Certain minerals necessary for plant growth are absorbed from the soil, but these could just as easily be added to water. Because it requires rather sophisticated equipment, it is not possible to demonstrate to the students the role and necessity of water in making food. Because they have added water to their plants to make them grow, it should be obvious to the students that the water is involved in the food-making process.

To manufacture is to synthesize or put together, and since plant food synthesis takes place only in the presence of light, the entire process is called <u>photosynthesis</u>. While photosynthesis is a very complicated process -- its study is the life's work of many scientists -- for the purposes of this program it can be summarized as follows:

$$\text{AIR + WATER} \xrightarrow{\text{LIGHT + "GREEN STUFF"}} \text{FOOD (STARCH)}$$

CORE D RATIONALE (continued)

water, and "green stuff" (chlorophyll). Each area is then examined and/or discussed in the activities which follow. By the time the core has been completed, the students have helped to fill in the blank areas on the chart designating the contribution of each factor.

Activity 3-20 (Hungry Plants) establishes that plants need food for energy just as animals do. Soil is identified as a factor in the plant's environment, but the point is made that it is not "eaten" or used up by the plant as it grows. Water is also shown to be necessary for growth, but it is made apparent that the water does not by itself supply energy.

While food comes in a variety of forms in the plant world, starch is one of the most common and the most easily detected by testing. Activity 3-21 (Testing For Starch) provides the student with a simple and easily recognizable means by which the presence of starch may be detected in the leaves of plants. This is necessary in order to determine whether or not food is actually produced when certain environmental factors thought to be involved in food production are controlled.

By partially covering the leaves of plants in Activity 3-22 (Sun Spots) the student is able to observe the resulting effect on starch production in that portion of the leaf that is deprived of sunlight. Those spots or leaf areas that have been exposed to light will show the presence of starch in sharp contrast to the covered portions of the leaf. In Activity 3-23 (Plants Have An Air About Them), again using the starch test, the students can see that leaves which have been deprived of air do not produce food. The same point is made about chlorophyll in Activity 3-24 (The Green Machine). Variegated geraniums or coleus plants are tested for starch and are found to contain food only in those portions of the leaves which contain

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BACKGROUND INFORMATION FOR THE TEACHER (continued)

Simple sugar is the first food product produced in photosynthesis but is normally converted to starch as it is formed. Since the test for starch is easy to do it is most often used in establishing the presence of food in plants. It is important to realize that scientists define food as any substance taken into the body that can be utilized for the release of energy, building and repair of tissues, or for regulation of body processes. This broad definition includes carbohydrates, fats, proteins, water, minerals, and vitamins. The first three can be sources of energy and are considered foods for the purposes of this program. Minerals and vitamins, like water, do not supply energy but are equally important in maintaining life. Activity 3-21 (Testing For Starch) directs the students in using the starch test. When iodine potassium iodide (IKI) solution is applied to a food substance containing starch, a very obvious and characteristic color change takes place. The starch in the food material, when exposed to IKI solution, becomes very dark, black, or blue-black. Negative results, or no color change, indicate that starch is not present.

In Activity 3-22 (Sun Spots) the student tests a leaf for starch that has been covered to prevent light from reaching it. Energy produced in the sun is released as solar radiation. Since all energy stored in food on Earth comes from this radiation, preventing the sun from reaching the green leaf prevents the formation of starch. Activity 3-24 (The Green Machine) uses the starch test to show that only the green portions of a plant convert the sun's energy to starch. We know this is true because photosynthesis can occur only in the presence of the green pigment, chlorophyll. The chlorophyll molecule has the unique property of being able to "capture" the sun's energy and use it to combine the atoms of water and carbon dioxide, forming new energy-rich food compounds in the process.

CORE D RATIONALE (continued)

"green stuff" (chlorophyll). From these activities, then, it can be inferred that food-making in plants occurs only when certain conditions prevail. The chart, which focused on plant needs at the beginning of the core, will then be completed. Those factors considered important in the food-making process have been investigated and conclusions have been drawn.

It is hoped that these activities will enhance the students' appreciation of the role of plants in the environment. Will they appreciate the sun a little more if they realize this is associated with energy in food? Will their lives be richer if they can look at a green field, a tree, or a scenic picture of the outdoors and know why plants are green? Will they be able to care for plants, a garden, or a lawn better if they have some understanding of plant needs? It is the intent of this program that through these experiences they will be closer to achieving those rather intangible goals which are so important for a meaningful life.

BACKGROUND

Activity 3-23 (Pla
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BACKGROUND INFORMATION FOR THE TEACHER (continued)

Activity 3-23 (Plants Have An Air About Them) demonstrates that without air the plant would be unable to make food. As indicated above, not everything that we call air is involved, only the carbon dioxide component. Carbon dioxide provides the carbon used in constructing the organic starch molecule.

The process of photosynthesis and its importance to living things can be reviewed and summarized as follows:

1. CARBON DIOXIDE + WATER + CHLOROPHYLL + LIGHT $\xrightarrow{\text{PRODUCE}}$ FOOD (STARCH)

2. Plants, like other living things, need food for energy.

3. Plants change light energy from the sun into food energy.

4. Water and air (carbon dioxide) are the raw materials for photosynthesis. These come from the plant's environment.

5. Inside the plant, in the presence of chlorophyll, these two raw materials are converted to sugar, and then usually to starch.

6. The function of chlorophyll is to "trap" the light energy.

Me and my Environment

UNIT III
CORE D

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in the*
be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-20. Hungry Plants Page _____ Date planned _____	35mm Slide projector Paper clips Black construction paper	Chart Camera (Polaroid Square Shooter) Slide 3-37 Slide 3-38 Slide 3-39 Slide 3-40	One box *Enough to make* "The Living Pl Plant Entering Plant At Super Plant Eating A Willow Tree in *Note: Step 2 of now*
3-21. Testing For Starch Page _____ Date planned _____	Geranium plants Cornstarch Food samples Green construction paper Black construction paper	Starch test solution Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Camera (Polaroid Square Shooter)	*These should h Activity 3-1* *One box* *Examples inclu cottage chee* One sheet 8 1/ One sheet 8 1/ *IKI solution i students* Use extra hot One per team o One per team o One pair per t One per team o

PLANNING GUIDE

me activities (*indicated in italics and an ☛ in the margin*) must prepared several days or weeks in advance. Use this summary as teaching and preparation schedule. All supplies needed are listed.

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st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
per		One box *Enough to make one 3" X 5" piece per student*
	Chart	"The Living Plant"
	Camera (Polaroid Square Shooter)	
	Slide 3-37	Plant Entering Restaurant
	Slide 3-38	Plant At Supermarket
	Slide 3-39	Plant Eating At Table
	Slide 3-40	Willow Tree in Tub Experiment *Note: Step 2 of Teacher Preparation section must be taken care of now to insure success in later activities* ☛
		These should have been growing now for several weeks from Activity 3-1. ☛
		One box
		Examples including: raw potato, crackers, bread, bean seeds, cottage cheese, raw meat, etc.
per		One sheet 8 1/2" X 11"
per		One sheet 8 1/2" X 11"
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
	Hot plate	Use extra hot plates or stove if available
	1000 ml Beaker	One per team of four students
	250 ml Beaker	One per team of four students
	70% Alcohol	
	Forceps	One pair per team of four students
	Petri dish	One per team of two students
	Camera (Polaroid Square Shooter)	

Me and my Environment

UNIT III
CORE D

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Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-22. Sun Spots Page _____ Date planned _____	Bean plants with leaves partially covered	Camera (Polaroid Square Shooter) Hot plate Starch test solution 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Radiometer Chart	➘ *Started in Act* Use extra hot *IKI solution i students* One per team o One per team o One pair per t One per team o One "The Living Pl
3-23. Plants Have An Air About Them Page _____ Date planned _____	Bean plants Saran Wrap String Paper Tags	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution Forceps Petri dish Camera (Polaroid Square Shooter)	➘ *Previously sta* One roll Several feet Class supply For marking le "The Living Pl Use additional One per team o One per team o *IKI solution i students* One per team o One per team o

PLANNING GUIDE

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st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
s		➘ *Started in Activity 3-20 and left in sun for several days*
	Camera (Polaroid Square Shooter)	
	Hot plate	Use extra hot plates or stove if available
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
	1000 ml Beaker	One per team of four students
	250 ml Beaker	One per team of four students
	70% Alcohol	
	Forceps	One pair per team of four students
	Petri dish	One per team of two students
	Radiometer	One
	Chart	"The Living Plant"
		➘ *Previously started in Activity 3-1*
		One roll
		Several feet
		Class supply
		For marking leaves
	Chart	"The Living Plant"
	Hot plate	Use additional hot plates or stove if available
	1000 ml Beaker	One per team of four students
	250 ml Beaker	One per team of four students
	70% Alcohol	
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
	Forceps	One per team of four students
	Petri dish	One per team of two students
	Camera (Polaroid Square Shooter)	

Me and my Environment

UNIT III
CORE D

PLANNING GUIDE

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Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
3-24. The Green Machine Page _____ Date planned	Variegated (multi-colored) geranium or coleus plant Variety of green plants White paper	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution Forceps Petri dish	*Secure from lo activity. T them for you For display pu you cannot k* Class supply "The Living Pl Use additional One per team o One per team o *IKI solution i students.* One per team o One per team o
3-25. Review Of Success Page _____ Date planned _____	35mm Slide projector	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Succ Review Of Succ Review Of Succ

PLANNING GUIDE

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st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
red) lant		*Secure from local florist or garden center in advance of this activity. If they do not have them in stock, they can order them for you.* ☛
s		*For display purposes. You can borrow them just for the day if you cannot keep a lot of plants in your room.*
	Chart	Class supply
	Hot plate	"The Living Plant"
	1000 ml Beaker	Use additional hot plates or stove if available
	250 ml Beaker	One per team of four students
	70% Alcohol	One per team of four students
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students.*
	Forceps	One per team of four students
	Petri dish	One per team of two students
	Worksheet 3-20	Review Of Success
	Slide 3-41	Review Of Success Questions 1-10
	Slide 3-42	Review Of Success Question 11

Me and my Environment

UNIT III
CORE D

PLANNING GUIDE

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Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
3-20. Hungry Plants Page _____ Date planned _____	35mm Slide projector Paper clips Black construction paper	Chart Camera (Polaroid Square Shooter) Slide 3-37 Slide 3-38 Slide 3-39 Slide 3-40	One box *Enough to make* The Living Pla Plant Entering Plant At Super Plant Eating A Willow Tree in *NOTE: Step 2 of now*
3-21. Testing For Starch Page _____ Date planned _____	Geranium plants Cornstarch Food samples Green construction paper Black construction paper	Starch test solution Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Camera (Polaroid Square Shooter)	*These should h Activity 3-1* *One box* *Examples inclu cottage chee* One sheet 8 1/ One sheet 8 1/ *IKI solution i students* Use extra hot One per team o One per team o One pair per t One per team o

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st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
er		One box *Enough to make one 3" X 5" piece per student*
	Chart	The Living Plant
	Camera (Polaroid Square Shooter)	
	Slide 3-37	Plant Entering Restaurant
	Slide 3-38	Plant At Supermarket
	Slide 3-39	Plant Eating At Table
	Slide 3-40	Willow Tree in Tub Experiment *NOTE: Step 2 of Teacher Preparation section must be taken care of now to insure success in later activities* ☛
		These should have been growing now for several weeks from Activity 3-1. ☛
		One box
		Examples including: raw potato, crackers, bread, bean seeds, cottage cheese, raw meat, etc.
er		One sheet 8 1/2" X 11"
er		One sheet 8 1/2" X 11"
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
	Hot plate	Use extra hot plates or stove if available
	1000 ml Beaker	One per team of four students
	250 ml Beaker	One per team of four students
	70% Alcohol	
	Forceps	One pair per team of four students
	Petri dish	One per team of two students
	Camera (Polaroid Square Shooter)	

Me and my Environment

UNIT III
CORE D

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ↙ *in the*
be prepared several days or weeks in advance. Use thi
a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
3-22. Sun Spots Page _____ Date planned _____	Bean plants with leaves partially covered		*Started in Act*
		Camera (Polaroid Square Shooter)	
		Hot plate	Use extra hot
		Starch test solution	*IKI solution i students*
		1000 ml Beaker	One per team o
		250 ml Beaker	One per team o
		70% Alcohol	
		Forceps	One pair per t
		Petri dish	One per team o
		Radiometer	One
		Chart	The Living Pla
3-23. Plants Have An Air About Them Page _____ Date planned _____	Bean plants		*Previously sta*
	Saran Wrap		One roll
	String		Several feet
	Paper		Class supply
	Tags		For marking le
		Chart	The Living Pla
		Hot plate	Use additional
		1000 ml Beaker	One per team o
		250 ml Beaker	One per team o
		70% Alcohol	
		Starch test solution	*IKI solution i students*
		Forceps	One per team o
		Petri dish	One per team o
		Camera (Polaroid Square Shooter)	

PLANNING GUIDE

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Materials in Supply Kit	
	➘ *Started in Activity 3-20 and left in sun for several days*
Camera (Polaroid Square Shooter)	
Hot plate	Use extra hot plates or stove if available
Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
1000 ml Beaker	One per team of four students
250 ml Beaker	One per team of four students
70% Alcohol	
Forceps	One pair per team of four students
Petri dish	One per team of two students
Radiometer	One
Chart	The Living Plant
	➘ *Previously started in Activity 3-1*
	One roll
	Several feet
	Class supply
	For marking leaves
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Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students*
Forceps	One per team of four students
Petri dish	One per team of two students
Camera (Polaroid Square Shooter)	

Me and my Environment

UNIT III
CORE D

PLANNING GUIDE

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Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics an*
3-24. The Green Machine Page _____ Date planned _____	Variegated (multi-colored) geranium or coleus plant Variety of green plants White paper	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution Forceps Petri dish	*Secure from loca activity. If them for you.* *For display purp you cannot kee* Class supply The Living Plant Use additional h One per team of One per team of *IKI solution in students.* One per team of One per team of
3-25. Review Of Success Page _____ Date planned _____	35mm Slide projector	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Succes Review Of Succes Review Of Succes

PLANNING GUIDE

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t of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
ed) ant		*Secure from local florist or garden center in advance of this activity. If they do not have them in stock, they can order them for you.*
		For display purposes. You can borrow them just for the day if you cannot keep a lot of plants in your room.
	Chart	Class supply
	Hot plate	The Living Plant
	1000 ml Beaker	Use additional hot plates or stove if available
	250 ml Beaker	One per team of four students
	70% Alcohol	One per team of four students
	Starch test solution	*IKI solution in Barnes dropping bottles, one per team of four students.*
	Forceps	One per team of four students
	Petri dish	One per team of two students
	Worksheet 3-20	Review Of Success
	Slide 3-41	Review Of Success Questions 1-10
	Slide 3-42	Review Of Success Question 11

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

MATERIALS

Camera (Polaroid Square Shooter)
Polaroid color film
*35mm Slide projector
The Living Plant Chart
*3" X 5" Black construction paper
1 piece per student
*Paper clips
Slides 3-37 through 3-40

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 3-20. Hungry Plants

This activity will concern itself with the following questions:

1. *Do plants need food?*

2. *If so, where do they get it?*

Teacher Preparation:

1. Since these next activities deal with a step-by-step process to develop the idea of photosynthesis, please read over this core before proceeding so that you will guard against giving the students any information early in the core that they will be discovering for themselves later.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-20. HUNGRY PLANTS

OCUS FOR THIS ACTIVITY

OALS:

. Realize and appreciate the energy interrelationships between organisms.

. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES:

. Determine that plants contain food.

. Appreciate the role of green plants in supplying food to the remainder of the living world.

TEACHING STRATEGIES

20. Hungry Plants

ty will concern itself with the following

plants need food?

so, where do they get it?

paration:

these next activities deal with a step-by-process to develop the idea of photosynthesis, e read over this core before proceeding so that ill guard against giving the students any mation early in the core that they will be vering for themselves later.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have stated that plants need food to grow.
--have discussed Slides 3-37, 3-38, 3-39, and 3-40.
--have said that water does not provide energy and is not a food.
--have made a guess about where plants get their food.

MATERIALS

TEACHING STRATEGIES

2. To have plants ready for Activity 3-21, you must prepare them now.

Use the bean plants grown by the students. Plants to be tested should be placed in the dark and watered three days before this activity begins. This is to make sure the starch already present in the leaves is used up. The experiment can be done with plants that have not been kept in the dark, but the results are not so pronounced.

Begin by saying:

> TODAY WE ARE GOING TO START AN EXPERIMENT WITH PLANTS. IT WILL TAKE THREE DAYS, AND WE WILL NEED TO LEARN MORE ABOUT PLANTS BEFORE WE CAN FINISH THE EXPERIMENT. I'LL EXPLAIN WHAT WE WILL DO TODAY TO BEGIN THE EXPERIMENT, AND YOU CAN MAKE SOME PREDICTIONS ABOUT WHAT WE ARE INVESTIGATING. HERE IS YOUR FIRST CLUE: THE PLANTS WE WILL USE HAVE BEEN KEPT IN THE DARK FOR THREE DAYS. WHAT DO YOU THINK WE WANT TO FIND OUT ABOUT PLANTS?

Record their answers on a corner of the board or on a poster to refer to in Activity 3-22. Then say:

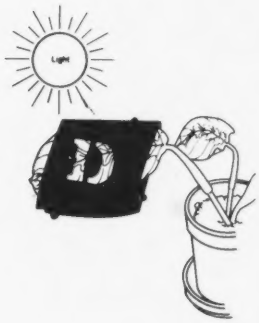
> HERE IS YOUR NEXT CLUE. WE ARE GOING TO CUT A LITTLE DESIGN IN A PIECE OF PAPER. THEN WE WILL COVER ONE OF THE LEAVES WITH THE PAPER EXCEPT WHERE THE OPEN DESIGN ALLOWS PART OF THE LEAF TO SHOW THROUGH. WHAT DO YOU THINK WE MIGHT FIND OUT BY DOING THIS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ve plants ready for Activity 3-21, you must re them now. h plants grown by the students. Plants to be ld be placed in the dark and watered three this activity begins. This is to make sure already present in the leaves is used up. ent can be done with plants that have not been dark, but the results are not so pronounced. ying: WE ARE GOING TO START AN EXPERIMENT WITH . IT WILL TAKE THREE DAYS, AND WE WILL) LEARN MORE ABOUT PLANTS BEFORE WE CAN THE EXPERIMENT. I'LL EXPLAIN WHAT WE) TODAY TO BEGIN THE EXPERIMENT, AND YOU KE SOME PREDICTIONS ABOUT WHAT WE ARE IGATING. HERE IS YOUR FIRST CLUE: THE WE WILL USE HAVE BEEN KEPT IN THE DARK REE DAYS. WHAT DO YOU THINK WE WANT TO UT ABOUT PLANTS? : answers on a corner of the board or on a efer to in Activity 3-22. Then say: YOUR NEXT CLUE. WE ARE GOING TO CUT LE DESIGN IN A PIECE OF PAPER. THEN WE VER ONE OF THE LEAVES WITH THE PAPER WHERE THE OPEN DESIGN ALLOWS PART OF THE SHOW THROUGH. WHAT DO YOU THINK WE MIGHT T BY DOING THIS?	Students: --respond, "Do they need light," "What happens to plants in the dark?" --respond, "What light and dark do to the leaves," "What happens when only a part of a plant is in the light."

DISTRIBUTE MATERIALS

MATERIALS

Diagram 3-14



TEACHING STRATEGIES

a. Distribute a 3" X 5" piece of black construction paper to each student.

b. Have students fold the paper in half the short way (2 1/2" X 3").

c. Have students cut a design in one-half of the paper with a pair of scissors. This design could be a circle, star, square, initial, etc. (See Diagram 3-14.)

d. Each student then places the black paper over one of the leaves of a bean plant so the leaf is sandwiched between the two pieces of paper. Using paper clips, student fastens the paper to the leaf so that a minimum amount of light shines under the edges. The design should be on the side of the leaf that is most exposed to light. (See Diagram 3-14.)

e. Place plants in direct sunlight or under a lamp for three days, or until Activity 3-21.

Select two or three students to take pictures of this set-up for their experiment. (It would be desirable for all students to make a photographic record of this experiment if the film supply will permit.) Have students label the pictures and store them for use at the end of the experiment.

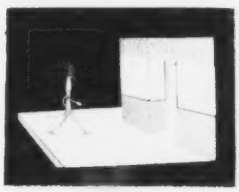
The plants are being prepared in advance so the covered leaves will grow at least three days before being tested.

NOTE: *This experiment is continued in Activity 3-22.*

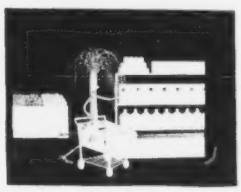
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ute a 3" X 5" piece of black construction o each student. udents fold the paper in half the short way " X 3"). udents cut a design in one-half of the paper pair of scissors. This design could be a , star, square, initial, etc. (See Diagram udent then places the black paper over one of ves of a bean plant so the leaf is sandwiched the two pieces of paper. Using paper clips, fastens the paper to the leaf so that a amount of light shines under the edges. The should be on the side of the leaf that is most to light. (See Diagram 3-14.) lants in direct sunlight or under a lamp ee days, or until Activity 3-21. three students to take pictures of this set- experiment. (It would be desirable for all ake a photographic record of this experiment upply will permit.) Have students label and store them for use at the end of the **CAMERA TIME** e being prepared in advance so the covered row at least three days before being tested. *xperiment is continued in Activity 3-22.*	

MATERIALS

Slide 3-37



Slide 3-38



TEACHING STRATEGIES

Then continue by saying:

DURING THE PAST FEW DAYS WE HAVE STUDIED SOME OF THE THINGS THAT ANIMALS EAT. WE HAVE TRACED AND BUILT MANY FOOD CHAINS. WHAT DID WE FIND AT THE END OF THESE FOOD CHAINS?

DO PLANTS GROW?

WHAT DO PLANTS NEED IN ORDER TO GROW?

Project Slide 3-37 and say:

WHAT DO YOU SEE IN THIS PICTURE?

COULD A PLANT GET ITS FOOD THIS WAY?

Project Slide 3-38 and say:

WHAT DO YOU SEE IN THIS PICTURE?

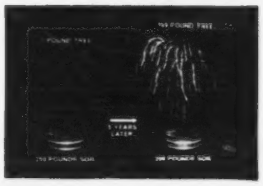
COULD A PLANT GET ITS FOOD THIS WAY?

WORK TIME

DON'T ASK LEA QUESTIONS

HAVE Y INVOLV ALL STUDEN

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
WORK TIME	
ue by saying:	
THE PAST FEW DAYS WE HAVE STUDIED SOME OF INGS THAT ANIMALS EAT. WE HAVE TRACED AND MANY FOOD CHAINS. WHAT DID WE FIND AT THE THESE FOOD CHAINS?	--recall and respond, "Plants."
TS GROW?	--respond, "Yes."
PLANTS NEED IN ORDER TO GROW?	--respond, "Food."
e 3-37 and say:	
YOU SEE IN THIS PICTURE?	--describe a plant going to a restaurant.
PLANT GET ITS FOOD THIS WAY?	--respond, "No, plants can't go anywhere," "Plants can't eat in a restaurant."
DON'T ASK LEADING QUESTIONS HERE	
e 3-38 and say:	
YOU SEE IN THIS PICTURE?	--describe a plant shopping in a supermarket.
PLANT GET ITS FOOD THIS WAY?	--respond, "No."
HAVE YOU INVOLVED ALL STUDENTS?	

MATERIALS	TEACHING STRATEGIES
Slide 3-39 	Project Slide 3-39 and say: WHAT DO YOU SEE IN THIS PICTURE? COULD A PLANT GET ITS FOOD THIS WAY? HOW DO YOU SUPPOSE PLANTS GET THE FOOD THEY NEED IN ORDER TO GROW?
	INVOLVE YOU SLOWEST STUDENT
	Accept and discuss all student responses, but do <u>not</u> interject ideas about whether the responses are right or wrong. Then say: A SCIENTIST WANTED TO FIND OUT WHERE A PLANT GOT THE FOOD THAT IT NEEDED TO GROW. HE PLANTED A SMALL TREE IN A TUB OF SOIL. HE CAREFULLY WEIGHED THE SOIL AND THE PLANT. HE THEN CAREFULLY COVERED THE SOIL SO THAT NOTHING ELSE COULD GET IN EXCEPT THE WATER THAT HE ADDED. HE SET THE PLANT OUTSIDE, WATERED IT ONLY WITH PURE WATER, AND WATCHED IT GROW FOR FIVE YEARS.
Slide 3-40 	Project Slide 3-40 and say: HOW MUCH DID THE TREE WEIGH WHEN IT WAS PLANTED? HOW MUCH DID THE TREE WEIGH AFTER FIVE YEARS? DID THE TREE NEED FOOD IN ORDER TO GROW THAT MUCH?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
de 3-39 and say:	Students:
) YOU SEE IN THIS PICTURE?	--describe a plant sitting at a table eating.
A PLANT GET ITS FOOD THIS WAY?	--respond, "No."
YOU SUPPOSE PLANTS GET THE FOOD EED IN ORDER TO GROW?	--guess, "They eat dirt," "Don't know," "From water," etc.
INVOLVE YOUR SLOWEST STUDENTS	
iscuss all student responses, but do not deas about whether the responses are right or	
NTIST WANTED TO FIND OUT WHERE A PLANT GOT OD THAT IT NEEDED TO GROW. HE PLANTED A TREE IN A TUB OF SOIL. HE CAREFULLY WEIGHED IL AND THE PLANT. HE THEN CAREFULLY COVERED IL SO THAT NOTHING ELSE COULD GET IN EXCEPT TER THAT HE ADDED. HE SET THE PLANT OUTSIDE,) IT ONLY WITH PURE WATER, AND WATCHED IT GROW VE YEARS.	
de 3-40 and say:	
CH DID THE TREE WEIGH WHEN IT WAS PLANTED?	--study the slide and reply, "5 pounds."
H DID THE TREE WEIGH AFTER FIVE YEARS?	--study the slide and reply, "169 pounds."
TREE NEED FOOD IN ORDER TO GROW THAT	--respond, "Yes."

MATERIALS

TEACHING STRATEGIES

WHERE DID ITS FOOD COME FROM?

HOW MUCH DID THE SOIL WEIGH WHEN THE TREE WAS PLANTED?

HOW MUCH DID THE SOIL WEIGH AFTER FIVE YEARS?

DID THE PLANT EAT THE SOIL?

If students do not respond with a "no" answer for the above question, ask:

IF PLANTS DID EAT THE SOIL, MORE SOIL WOULD HAVE TO BE ADDED TO THE POT BECAUSE THE PLANTS WOULD USE UP THE SOIL. DID THE SCIENTISTS KEEP ADDING MORE SOIL TO THE POT?

IF NO EXTRA SOIL WAS ADDED, COULD THE PLANT HAVE EATEN ANY?

IF THE PLANT DIDN'T USE ANY SOIL, THEN WHERE DO YOU THINK THE PLANT GOT ITS FOOD?

As a further explanation to the students, say:

PLANTS DO NOT EAT SOIL FOR FOOD. THE SOIL HOLDS THE PLANTS DOWN AND PREVENTS THEM FROM BEING BLOWN AWAY. IT ALSO HOLDS THE WATER WHICH PLANTS TAKE IN THROUGH THEIR ROOTS.

DO PLANTS NEED WATER?

COULD THE WILLOW TREE HAVE GROWN 164 POUNDS FROM THE WATER THAT THE SCIENTIST ADDED?

Turn off the projector and say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
DID ITS FOOD COME FROM?	Students: --suggest that it came from the water or from the dirt, though responses may vary.
UCH DID THE SOIL WEIGH WHEN THE TREE WAS ED?	--respond, "200 pounds."
UCH DID THE SOIL WEIGH AFTER FIVE YEARS?	--respond, "It still was the same, 200 pounds."
HE PLANT EAT THE SOIL?	--infer that it did not since the soil did not weigh less.
If students do not respond with a "no" answer for the above question, ask: IF PLANTS DID EAT THE SOIL, MORE SOIL WOULD HAVE TO BE ADDED TO THE POT BECAUSE THE PLANTS WOULD USE UP THE SOIL. DID THE SCIENTISTS KEEP ADDING MORE SOIL TO THE POT?	--recall, "No."
IF NO EXTRA SOIL WAS ADDED, COULD THE PLANT HAVE EATEN ANY?	--infer, "No."
IF THE PLANT DIDN'T USE ANY SOIL, THEN WHERE DO YOU THINK THE PLANT GOT ITS FOOD?	--respond, "Don't know," "From the water."
er explanation to the students, say: S DO NOT EAT SOIL FOR FOOD. THE SOIL THE PLANTS DOWN AND PREVENTS THEM FROM BLOWN AWAY. IT ALSO HOLDS THE WATER PLANTS TAKE IN THROUGH THEIR ROOTS.	
ANTS NEED WATER?	--respond that plants need water.
THE WILLOW TREE HAVE GROWN 164 POUNDS THE WATER THAT THE SCIENTIST ADDED?	--respond, "Yes," "Must have," "It didn't eat the dirt."
e projector and say:	

MATERIALS	TEACHING STRATEGIES
	WHAT WAS THE ONLY THING THAT THE SCIENTISTS GAVE THE PLANT EVERY DAY? IS WATER FOOD? WHAT DO WE NEED FOOD FOR? DOES WATER GIVE US ENERGY? COULD YOU LIVE JUST BY DRINKING WATER, AND NOT EATING ANYTHING? THEN DO YOU GET ANY ENERGY FROM WATER? Then say: WATER IS NOT A FOOD. IT HAS NO ENERGY IN IT. LIVING THINGS DO NEED WATER, BUT NOT FOR FOOD. Continue by saying: IF WATER ISN'T A FOOD FOR US, IS IT A FOOD FOR OTHER ANIMALS? IS WATER FOOD FOR PLANTS? IS AIR A FOOD? FOR ANIMALS? FOR PLANTS? IS LIGHT A FOOD? FOR ANIMALS? FOR PLANTS?

ACCEPT
ANSWE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
VAS THE ONLY THING THAT THE SCIENTISTS THE PLANT EVERY DAY?	--recall, "Water."
ER FOOD?	--respond, "No," "Yes," "Could be," "Don't know."
O WE NEED FOOD FOR?	--recall, "Energy."
ATER GIVE US ENERGY?	--respond, "Yes," "No," "Maybe."
YOU LIVE JUST BY DRINKING WATER, AND NOT ANYTHING?	--respond, "No."
O YOU GET ANY ENERGY FROM WATER?	--infer that since water does not contain any energy, it must not be a food.
IS NOT A FOOD. IT HAS NO ENERGY IN IT. THINGS DO NEED WATER, BUT NOT FOR FOOD.	
saying:	
ER ISN'T A FOOD FOR US, IS IT A FOOD FOR ANIMALS?	--respond, "No." "It doesn't have energy."
ER FOOD FOR PLANTS?	--respond, "Yes," "No," "Maybe," "I don't know."
A FOOD? FOR ANIMALS? FOR PLANTS?	--respond with various guesses.
ACCEPT ALL ANSWERS	
HT A FOOD? FOR ANIMALS? FOR PLANTS?	--respond with various guesses.

MATERIALS

TEACHING STRATEGIES

ACCEPT ANSWE

Now ask for a show of hands and record the number of students who think water, light, and/or air are foods.

If many students do not raise hands in response to the questions, continue with the statement below. If many students do raise their hands indicating they think air, water, and light are foods, spend additional time clarifying this concept of need versus food.

Then say:

> SCIENTISTS AGREE THAT WATER, LIGHT, AND AIR ARE NOT FOODS. IF THEY ARE NOT, THEN WHERE DO PLANTS GET THEIR FOOD? FOR THE NEXT FEW DAYS THIS IS THE QUESTION WE WILL BE TRYING TO ANSWER.
>
> DOES ANYONE HAVE ANY IDEA WHERE PLANTS GET THEIR FOOD?

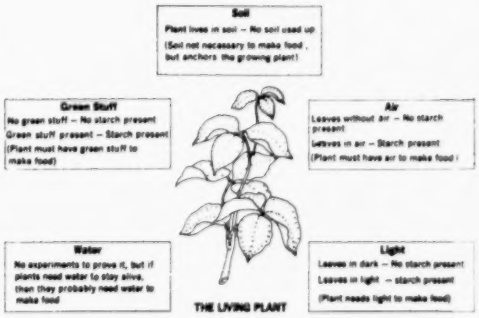
GIVE STUDE TIME TO THINK

ASK F OTHER IDE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ACCEPT ALL ANSWERS	
a show of hands and record the number of o think water, light, and/or air are foods. dents do not raise hands in response to the continue with the statement below. If many raise their hands indicating they think air, light are foods, spend additional time clari- concept of need versus food.	
STS AGREE THAT WATER, LIGHT, AND AIR FOODS. IF THEY ARE NOT, THEN WHERE TS GET THEIR FOOD? FOR THE NEXT FEW IS IS THE QUESTION WE WILL BE TRYING ER. YONE HAVE ANY IDEA WHERE PLANTS GET OOD?	--speculate and provide a variety of guesses.
GIVE STUDENTS TIME TO THINK	
ASK FOR OTHER IDEAS	

MATERIALS

Diagram 3-15



TEACHING STRATEGIES

After allowing ample time for speculation and discussion, introduce The Living Plant Chart. (See Diagram 3-15.)

Display the chart and say:

> HERE IS A CHART ABOUT PLANTS. WE WILL BE PUTTING INFORMATION ON THIS CHART AS WE COMPLETE THE NEXT FEW EXPERIMENTS. CAN ANYONE TELL ME WHAT HE SEES ON THE CHART?
>
> THE RECTANGLES STAND FOR THE THINGS THAT WE THINK PLANTS NEED. WE WILL BE DOING SOME EXPERIMENTS TO FIND OUT FOR SURE IF PLANTS DO NEED EACH ONE OF THESE THINGS. WHEN WE FIND OUT SOME INFORMATION, WE'LL WRITE IT IN ONE OF THE RECTANGLES. WHICH RECTANGLE COULD WE FILL IN BASED ON WHAT WE HAVE LEARNED TODAY?
>
> WHAT COULD WE WRITE IN THE SPACE TO TELL US WHAT SOIL HAS TO DO WITH PLANTS?

Have the class decide on a response similar to the one in Diagram 3-15. Appoint or select a volunteer to write in this information on the chart. Do the same for water. Keep the chart on display in the room for future use.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
owing ample time for speculation and discussion, The Living Plant Chart. (See Diagram 3-15.)	
e chart and say:	
IS A CHART ABOUT PLANTS. WE WILL BE NG INFORMATION ON THIS CHART AS WE LETE THE NEXT FEW EXPERIMENTS. CAN E TELL ME WHAT HE SEES ON THE CHART?	--describe chart, mentioning the plant in the center and the air, light, water, green stuff, and soil rectangles around it.
ECTANGLES STAND FOR THE THINGS THAT WE PLANTS NEED. WE WILL BE DOING SOME IMENTS TO FIND OUT FOR SURE IF PLANTS ED EACH ONE OF THESE THINGS. WHEN WE OUT SOME INFORMATION, WE'LL WRITE IT E OF THE RECTANGLES. WHICH RECTANGLE WE FILL IN BASED ON WHAT WE HAVE ED TODAY?	--reply, "Soil," "Soil rectangle," "Water," "Water rectangle."
COULD WE WRITE IN THE SPACE TO TELL US SOIL HAS TO DO WITH PLANTS?	--suggest, "They didn't eat it because the soil didn't disappear," "They didn't use it for food," "Plants grow in it."
lass decide on a response similar to the one in 15. Appoint or select a volunteer to write in mation on the chart. Do the same for water. hart on display in the room for future use.	

UNIT III, CORE D
ACTIVITY 3-20: "Hungry Plants"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did your students have difficulty thinking of the questions or problems suggested by the first two clues at the beginning of this activity?
☐ No ☐ Yes: What did you do?

18. When you asked for a show of hands, how many students still thought water, light, or air were foods for animals or plants?
☐ None 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Were any of your students able to answer the question, "Where do plants get their food?" by saying they make it?
☐ No ☐ Yes: Comment.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D
ACTIVITY 3-20: "Hungry Plants"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

MATERIALS

TEACHING STRATEGIES

Activity 3-21. Testing For Starch

Before recognizing that plants make their own food, students must first establish that food is present in plants. In this activity the students will learn that starch is a food and how to test for the presence of starch.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-21. TESTING FOR STARCH

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

TEACHING STRATEGIES

-21. Testing For Starch

ognizing that plants make their own food, ust first establish that food is present in n this activity the students will learn that a food and how to test for the presence of

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have identified starch as a food.
--have placed starch test solution on corn starch and recognized that it provides a positive test for starch.
--have tested various foods for the presence of starch.
--have participated in extracting chlorophyll from a leaf and in testing the leaf for the presence of starch.

MATERIALS

*Geranium plants that have been growing for several weeks (bean plants may be substituted)
Starch test solution (IKI solution) in Barnes dropping bottles, 1 per team
*Cornstarch
*Several food samples, including raw potatoes, crackers, bread, bean seeds, cottage cheese, raw meat, apple
*Green paper (8 1/2" X 11")
*Black or purple paper (8 1/2" X 11")
1000 ml Pyrex beaker, 1 per team
250 ml Pyrex beaker, 1 per team
70% Alcohol
Pair tongs, 1 pper team
Petri dish, 1 per team
Camera (Polaroid Square Shooter)
Polaroid color film
Hot plate

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Have available one or more geranium or bean plants so that there is at least one leaf for each student.

2. Fill dropping bottles with starch test solution (IKI solution) -- one bottle per team of three or four students.

3. Prepare foods to be tested by cutting them into small portions.

4. Cut out two paper leaves the same size and shape -- one green, one black or dark purple -- from the sheets of construction paper.

Begin the activity by encouraging students to recall that plants have energy; ask:

WHAT KIND OF LIVING THING DID WE ALWAYS FIND AT THE END OF FOOD CHAINS?

WHAT DO PLANTS GIVE TO ALL THE OTHER LIVING THINGS IN THE FOOD CHAIN?

WE HAVE LEARNED THAT PLANTS SUPPLY ANIMALS WITH FOOD ENERGY. IF ALL ANIMALS GET THEIR FOOD FROM PLANTS, THEN WHERE DO PLANTS GET THEIR FOOD?

Some students may already realize that plants make food; others will realize this much later. At no point in this activity should they be told this information!

DO PLANTS REALLY HAVE FOOD IN THEM? TODAY WE ARE GOING TO DO SOME TESTS TO SEE IF WE CAN SHOW THAT PLANTS DO CONTAIN FOOD.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
paration:	
available one or more geranium or bean plants at there is at least one leaf for each student.	
dropping bottles with starch test solution solution) -- one bottle per team of three or students.	
re foods to be tested by cutting them into portions.	
ut two paper leaves the same size and shape -- reen, one black or dark purple -- from the s of construction paper.	
ctivity by encouraging students to recall that energy; ask:	
IND OF LIVING THING DID WE ALWAYS T THE END OF FOOD CHAINS?	--recall, "Plants."
O PLANTS GIVE TO ALL THE OTHER LIVING IN THE FOOD CHAIN?	--recall, "Energy," "Food energy," "Food."
E LEARNED THAT PLANTS SUPPLY ANIMALS WITH NERGY. IF ALL ANIMALS GET THEIR FOOD FROM , THEN WHERE DO PLANTS GET THEIR FOOD?	
ts may already realize that plants make food; realize this much later. At no point in this ould they be told this information!	
TS REALLY HAVE FOOD IN THEM? TODAY WE ARE O DO SOME TESTS TO SEE IF WE CAN SHOW THAT DO CONTAIN FOOD.	

MATERIALS	TEACHING STRATEGIES
	Hold up a box of cornstarch and say: WHAT KIND OF FOOD IS THIS? CORNSTARCH IS A FOOD YOU HAVE EATEN MANY TIMES BUT PROBABLY DIDN'T REALIZE IT BECAUSE YOU DON'T EAT IT RIGHT FROM THE BOX. YOUR MOTHER USES CORNSTARCH WHEN SHE MAKES SUCH THINGS AS GRAVY, PUDDINGS, AND SAUCES. Divide the class into teams of two. Select a student to put a spoonful of starch in a petri dish for each team. Distribute the starch test solution. HAVE STUD WORK IN Select two teams to photograph cornstarch in the petri dish <u>before</u> it is tested with IKI solution. Then select two teams to photograph cornstarch <u>after</u> it is tested with IKI solution. Label and put aside for use later in the experiment. CAMERA Then say: THIS IS STARCH TEST SOLUTION. PUT A DROP OF IT ON YOUR STARCH AND TELL ME WHAT HAPPENS.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
box of cornstarch and say: KIND OF FOOD IS THIS?	Students: --recognize or read from the box and reply, "Cornstarch."
STARCH IS A FOOD YOU HAVE EATEN MANY TIMES PROBABLY DIDN'T REALIZE IT BECAUSE YOU DON'T T RIGHT FROM THE BOX. YOUR MOTHER USES STARCH WHEN SHE MAKES SUCH THINGS AS GRAVY, INGS, AND SAUCES. e class into teams of two. Select a student to onful of starch in a petri dish for each team. e the starch test solution.	
 HAVE STUDENTS WORK IN PAIRS	
teams to photograph cornstarch in the petri e it is tested with IKI solution. Then select to photograph cornstarch after it is tested olution. Label and put aside for use later in ment.	
 CAMERA TIME	
IS STARCH TEST SOLUTION. PUT A DROP ON YOUR STARCH AND TELL ME WHAT HAPPENS.	--put a drop of IKI on the cornstarch and observe the color change; say, "It turned black," or "It turned dark purple."

MATERIALS

TEACHING STRATEGIES

Then ask:

WHAT COLOR WAS THE DROP OF STARCH TEST SOLUTION BEFORE YOU PUT IT ON YOUR STARCH?

HOW DID THE COLOR CHANGE WHEN YOU PUT IT ON THE STARCH?

WHAT SHOULD YOU LOOK FOR WHEN USING THE STARCH TEST SOLUTION TO FIND OUT IF SOMETHING HAS STARCH IN IT?

HOW COULD WE FIND OUT IF OTHER FOODS HAVE STARCH IN THEM?

Distribute the samples of other foodstuffs for the students to test. While they are completing the tests, list the foods on the board.

DISTRIBUTE MA

WOR
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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
OLOR WAS THE DROP OF STARCH TEST SOLUTION YOU PUT IT ON YOUR STARCH?	--respond, "Brown," "Orange," etc.
D THE COLOR CHANGE WHEN YOU PUT IT ON THE ?	--respond, "It turned black, dark purple," etc.
HOULD YOU LOOK FOR WHEN USING THE STARCH OLUTION TO FIND OUT IF SOMETHING HAS STARCH	--infer that a positive test for starch is indicated by a change in color from orange-brown to purple-black when IKI is added.
ULD WE FIND OUT IF OTHER FOODS HAVE STARCH M?	--suggest putting the starch test solution on other foods.
the samples of other foodstuffs for the test. While they are completing the tests, ods on the board.	--test additional foods for starch with starch test solution.

DISTRIBUTE MATERIALS

WORK TIME

MATERIALS	TEACHING STRATEGIES
	When the students have completed their tests, ask: DID YOU FIND STARCH IN THE (name of the food)? HOW DID YOU KNOW THAT (name of the food) HAS STARCH IN IT? Tabulate the results of the student's tests on the chalkboard as you continue the questioning until a response for all foods tested has been obtained. Encourage each student to participate. Then ask: HOW CAN WE FIND OUT IF PLANTS HAVE STARCH IN THEM? Distribute a fresh leaf (one that has been in sunlight) to each team and instruct them to test the leaf for starch. Select two teams to photograph leaves before and two teams to photograph leaves after they are tested for the presence of starch. Label photos and set aside for use later on in the experiment. Although the photo will not reveal the presence of starch, this is an important step in the interpretation and should be recorded. WHY DO WE WANT TO FIND OUT IF LEAVES HAVE STARCH IN THEM?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
students have completed their tests, ask:	
YOU FIND STARCH IN THE (name of the food)?	--refer to the results of their tests and respond appropriately.
DID YOU KNOW THAT (name of the food) HAS CH IN IT?	--respond, "It turned black."
the results of the student's tests on the chalk- you continue the questioning until a response for tested has been obtained. Encourage each student ipate.	
CAN WE FIND OUT IF PLANTS HAVE STARCH IN ?	--respond, "Put some of this solution on them."
e a fresh leaf (one that has been in sunlight) to and instruct them to test the leaf for starch.	
o teams to photograph leaves before and two teams raph leaves after they are tested for the presence . Label photos and set aside for use later on in iment. Although the photo will not reveal the of starch, this is an important step in the ation and should be recorded.	
DO WE WANT TO FIND OUT IF LEAVES HAVE STARCH IEM?	--respond to the effect that since starch is something we eat for energy, maybe it is also what plants use for food.

HAVE YOU INVOLVED ALL STUDENTS?

MATERIALS

TEACHING STRATEGIES

If students are not aware of why they are to test leaves for starch, remind them that they are trying to find out if plants have food, and if so, what it might be.

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TIM

WHAT HAPPENED WHEN YOU PUT THE SOLUTION ON THE LEAF?

DOES YOUR LEAF HAVE STARCH IN IT?

Hold up a sheet of green paper with a sheet of black or purple paper behind it, both previously cut in an identical shape of a leaf.

WHAT DO YOU SEE?

Now remove the green paper and ask:

NOW WHAT DO YOU SEE?

WHY COULDN'T YOU SEE THE PURPLE PAPER BEFORE?

IF THERE WAS STARCH IN THE LEAF, WHY DO YOU THINK THAT WE COULDN'T SEE IT WHEN WE ADDED THE STARCH TEST SOLUTION?

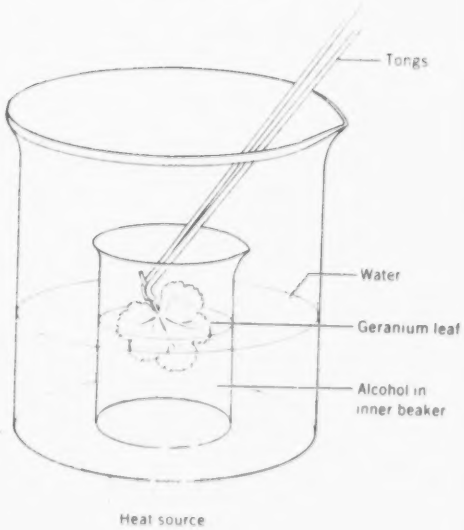
Discuss student responses to develop the idea that the green color of the leaf might hide the starch test color. Then ask:

WHAT COULD WE DO TO FIND OUT IF THERE REALLY IS STARCH IN THE LEAF?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
f students are not aware of why they are to est leaves for starch, remind them that hey are trying to find out if plants have ood, and if so, what it might be.	
WORK TIME	
APPENED WHEN YOU PUT THE SOLUTION ON THE	--respond, "Nothing," "It stayed the same."
OUR LEAF HAVE STARCH IN IT?	--respond, "No."
heet of green paper with a sheet of black or r behind it, both previously cut in an identical leaf.	
O YOU SEE?	--respond, "Green paper leaf."
the green paper and ask:	
AT DO YOU SEE?	--respond, "Purple paper leaf."
ULDN'T YOU SEE THE PURPLE PAPER BEFORE?	--respond, "The green paper was in the way," "It was behind the green paper."
RE WAS STARCH IN THE LEAF, WHY DO YOU THINK E COULDN'T SEE IT WHEN WE ADDED THE STARCH OLUTION?	--respond, "The green color in the leaf could hide the starch."
dent responses to develop the idea that the of the leaf might hide the starch test color.	
ULD WE DO TO FIND OUT IF THERE REALLY IS IN THE LEAF?	--suggest that the green color would have to be removed.

MATERIALS

Diagram 3-16



TEACHING STRATEGIES

WE CAN GET RID OF THE GREEN COLOR BY BOILING THE LEAF IN ALCOHOL.

Organize the class into groups of two, three, or four students, depending upon number of hot plates available, and instruct students to carry out the following procedures:

CAUTION: Alcohol is highly flammable. Do not heat over an open flame. Use a water bath as pictured in Diagram 3-16. Do not have the water level too high because when the water boils it will splash out into the alcohol and flame. Avoid breathing the alcohol vapors.

1. Set up the water bath for heating alcohol and water. Bring the water to a low boil.

2. Remove a leaf from a plant and immerse it in boiling water for a minute or two.

3. Remove the leaf from the water with tongs and put it into the boiling alcohol. After several minutes the leaf should lose most of its color and appear grayish or yellowish white.

4. Submerge the leaf again in the boiling water for a few seconds. (This will make the leaf less brittle.)

5. Place the leaf flat in a petri dish and add just enough starch test solution to cover the leaf.

6. Allow the leaf to sit in the starch test solution for at least five minutes. Meanwhile, alert a team to photograph the results of the starch test on the leaf.

Then ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
GET RID OF THE GREEN COLOR BY BOILING AF IN ALCOHOL. class into groups of two, three, or four pending upon number of hot plates available, students to carry out the following cohol is highly flammable. Do not heat over open flame. Use a water bath as pictured in agram 3-16. Do not have the water level too gh because when the water boils it will splash t into the alcohol and flame. Avoid breathing e alcohol vapors. the water bath for heating alcohol and Bring the water to a low boil. a leaf from a plant and immerse it in g water for a minute or two. the leaf from the water with tongs and into the boiling alcohol. After several s the leaf should lose most of its color pear grayish or yellowish white. ge the leaf again in the boiling water for seconds. (This will make the leaf less e.) the leaf flat in a petri dish and add nough starch test solution to cover the leaf. the leaf to sit in the starch test solution least five minutes. Meanwhile, alert a team tograph the results of the starch test on the	

MATERIALS	TEACHING STRATEGIES
	WHAT HAPPENED WHEN YOU PUT STARCH TEST SOLUTION ON THE LEAF? WHAT DOES IT MEAN? WHAT HAVE WE DONE TO SHOW THAT PLANTS DO HAVE FOOD IN THEM? Now select several students to arrange the photographs on the bulletin board (beginning with the cornstarch) showing the results of the starch testing process. Let them explain the process to the class. The starch test solution can be poured off of the leaves and can be reused. This will cut down on the volume of test solution that you consume in this series of experiments.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
HAPPENED WHEN YOU PUT STARCH TEST SOLUTION E LEAF? DOES IT MEAN? HAVE WE DONE TO SHOW THAT PLANTS DO HAVE IN THEM? several students to arrange the photographs on n board (beginning with the cornstarch) showing of the starch testing process. Let them process to the class. test solution can be poured off of the leaves reused. This will cut down on the volume of on that you consume in this series of .	Students: --respond, "It turned black." --interpret the color change, "Starch is present in the leaf," "Food is in the leaf." --respond by describing the test for starch and removal of chlorophyll so the test can be seen.

UNIT III, CORE D

ACTIVITY 3-21: "Testing For Starch"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. List the foods that your students tested according to the results they got:
Foods with starch:
Foods without starch:

18. Did your students understand why they were testing for starch?
☐ Yes ☐ No: Comment.

19. Did students have any difficulty removing the chlorophyll from the leaves?
☐ Yes ☐ No

20. Were any difficulties encountered in taking any of the pictures in this activity?
☐ No ☐ Yes: Comment.

21. Were students able to use the pictures to explain the experiment?
☐ Yes ☐ No: Comment.

22. Concern (or questions) about content:

23. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D
ACTIVITY 3-21: "Testing For Starch"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

3. Infer that the sun provides the energy upon which man and other life depends.

4. Determine that in the absence of light, plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

MATERIALS

TEACHING STRATEGIES

Activity 3-22. Sun Spots

This activity is designed to develop further the concept that plants make their own food. In the previous activity students tested a leaf for starch and concluded that

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-22. SUN SPOTS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

D OBJECTIVES:

1. Determine that plants contain food.

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TEACHING STRATEGIES

-22. Sun Spots

ity is designed to develop further the concept s make their own food. In the previous activity ested a leaf for starch and concluded that

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have prepared a leaf by covering part of it with a paper filter.

MATERIALS

Camera (Polaroid Square Shooter)
Polaroid film
*Bean plants set up during Activity 3-20 that have had part of a leaf covered and left in the sun for several days
Hot plates or stove for each student team
Starch test solution (IKI solution) in Barnes dropping bottles, one per student team
1000 ml Pyrex beaker, 1 per student team
250 ml Pyrex beaker, 1 per student team
70% Alcohol
12-Inch Tweezers or tongs, 1 per student team
Petri dish, 1 per student team
Radiometer
The Living Plant Chart

*Not furnished in materials kit

TEACHING STRATEGIES

plants have food present in them. This activity is the first of several that will examine the major requirements of the food-making process. The requirement for light will first be investigated as well as the role of the sun.

Teacher Preparation:

1. Refer to Activity 3-20, Core D for leaf preparation. Make certain that the leaves have been covered for at least three days.

2. Make sure The Living Plant Chart is hanging in view of the students.

A part of this activity will serve as a review of light energy, which was introduced in Activity 3-1, Core A.

Begin this activity by exhibiting the plants prepared earlier and say:

> A FEW DAYS AGO WE COVERED SOME LEAVES WITH BLACK PAPER. WHY DID WE DO THIS?
>
> DID THE PART OF THE LEAF UNDER THE PAPER GET ANY SUNLIGHT?
>
> HOW COULD YOU FIND OUT IF THE LEAVES HAVE ANY STARCH IN THEM?

Instruct the students to remove the leaves carefully and to follow the directions and cautions given in Activity 3-20 in removing the black paper from the leaves and performing the starch test.

TEACHING STRATEGIES

e food present in them. This activity is the everal that will examine the major requirements d-making process. The requirement for light will nvestigated as well as the role of the sun.

eparation:

r to Activity 3-20, Core D for leaf preparation. certain that the leaves have been covered for east three days.

sure The Living Plant Chart is hanging in of the students.

this activity will serve as a review of light ich was introduced in Activity 3-1, Core A.

activity by exhibiting the plants prepared d say:

DAYS AGO WE COVERED SOME LEAVES WITH BLACK WHY DID WE DO THIS?

HE PART OF THE LEAF UNDER THE PAPER GET ANY GHT?

OULD YOU FIND OUT IF THE LEAVES HAVE ANY I IN THEM?

he students to remove the leaves carefully and to directions and cautions given in Activity noving the black paper from the leaves and per- starch test.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have participated in a group that extracted the chlorophyll from a leaf and then tested the leaf for starch.
--have observed the radiometer demonstration.
--have recalled that there is energy in light.
--have concluded that plants get their energy to make food from the sun.

Students:

--recall purpose of the experiment and state it in their own words.

--respond, "No," "Probably not."

--recall and describe test for starch.

MATERIALS	TEACHING STRATEGIES
	Have students begin to take pictures that show which of several variables are needed to help the plant make its food. The first photo will show the effect of light on the leaf. Select two students to photograph the leaf showing the pattern of the paper cutout. Label the picture and put it aside. When the students have completed testing the leaves, ask: WHAT HAPPENED WHEN YOU PUT THE STARCH TEST SOLUTION ON THE LEAVES? The results will likely vary somewhat, for there may be some residual starch in the leaves. There should be, however, a striking difference between the part of the leaf that has been in the dark and the part in the light. The pattern the students cut out of the paper should be visible in the leaf as a result of the starch test. The part of the leaf covered should not respond to the starch test and remain white or gray. Discuss the results until the students agree that the part of the leaves which were in the dark have less starch in them than those in the light. Now ask: HOW CAN YOU EXPLAIN THE DIFFERENCE BETWEEN THE PART OF THE LEAF THAT WAS UNDER THE PAPER AND THE PART THAT WAS NOT UNDER THE PAPER?

WORK TIME

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
nts begin to take pictures that show which of riables are needed to help the plant make its first photo will show the effect of light on	
students to photograph the leaf showing the the paper cutout. Label the picture and put it	
WORK TIME	
tudents have completed testing the leaves, ask:	
HAPPENED WHEN YOU PUT THE STARCH TEST ION ON THE LEAVES?	--observe the tested leaf and relate the results.
s will likely vary somewhat, for there may be ual starch in the leaves. There should be, striking difference between the part of the has been in the dark and the part in the light. n the students cut out of the paper should be the leaf as a result of the starch test. The e leaf covered should not respond to the starch emain white or gray. Discuss the results until ts agree that the part of the leaves which were k have less starch in them than those in the	
AN YOU EXPLAIN THE DIFFERENCE BETWEEN THE OF THE LEAF THAT WAS UNDER THE PAPER AND ART THAT WAS NOT UNDER THE PAPER?	--respond with a variety of explanations; some students may suggest that the light must have been necessary for the starch to be there; others might suggest that the starch was used up for food or that the dark destroys starch.

MATERIALS

TEACHING STRATEGIES

If students have suggested that the plant uses light to make food, skip the following sequence and begin the radiometer demonstration described later in this activity.

> WHY DO WE EAT FOODS LIKE (list foods which you tested for starch), WHICH HAVE A LOT OF STARCH IN THEM?

Discuss the responses until students agree that we use those foods as a source of energy. Then ask:

> WHY DO YOU THINK THAT PLANTS HAVE STARCH IN THEM?

To elicit the desired response you may have to ask additional questions, such as:

> DO LIVING THINGS NEED ENERGY TO GROW?
>
> DO PLANTS GROW?
>
> ARE PLANTS ALIVE?
>
> DO PLANTS NEED ENERGY? WHY?
>
> DO FOODS WITH STARCH IN THEM HAVE ENERGY?
>
> WHERE DO PLANTS GET ENERGY?

It is important that the next sequence be followed very closely to develop the logic necessary to make the inferences desired.

Place the radiometer in a strong source of light, preferably sunlight coming through a classroom window or sunlight out of doors. Instruct the students to observe the radiometer, then ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
have suggested that the plant uses light to skip the following sequence and begin the demonstration described later in this activity.	Students:
WE EAT FOODS LIKE (list foods which you for starch), WHICH HAVE A LOT OF STARCH M?	--recall burning foods and infer that we eat starchy foods for energy.
responses until students agree that we use as a source of energy. Then ask:	
YOU THINK THAT PLANTS HAVE STARCH IN THEM?	--infer that plants can get energy from starch.
he desired response you may have to ask questions, such as:	
ING THINGS NEED ENERGY TO GROW?	--respond, "Yes."
NTS GROW?	--respond, "Yes."
ANTS ALIVE?	--respond, "Yes."
NTS NEED ENERGY? WHY?	--infer that plants need energy to grow.
DS WITH STARCH IN THEM HAVE ENERGY?	--respond, "Yes."
DO PLANTS GET ENERGY?	--respond, "From the starch," some students may respond that they get energy from the sun.
tant that the next sequence be followed very develop the logic necessary to make the desired.	
adiometer in a strong source of light, sunlight coming through a classroom window out of doors. Instruct the students to radiometer, then ask:	

MATERIALS	TEACHING STRATEGIES
	DOES ANYONE REMEMBER WHAT THIS IS CALLED? Write the word "radiometer" on the chalkboard. WHAT IS HAPPENING TO THE RADIOMETER? ARE THE FLAGS IN THE RADIOMETER MOVING? WHAT DOES IT TAKE TO CAUSE THINGS TO MOVE? WHERE IS THE ENERGY COMING FROM? IS THERE ENERGY IN SUNLIGHT? HOW COULD WE FIND OUT IF ENERGY FROM SUNLIGHT IS MAKING THE RADIOMETER MOVE? Allow a student to shade the radiometer and ask: WHAT HAPPENED? WHY? IS THERE ENERGY IN LIGHT? DO PLANTS NEED LIGHT TO GROW? WHAT DO YOU THINK PLANTS GET FROM LIGHT? IS THERE ENERGY IN STARCH? DID THE PART OF THE LEAF THAT WAS IN THE DARK HAVE ANY STARCH IN IT? WHY NOT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ANYONE REMEMBER WHAT THIS IS CALLED?	--recall first core of activities and respond, "Radiometer."
word "radiometer" on the chalkboard.	
IS HAPPENING TO THE RADIOMETER?	--describe the flags turning, spinning, indicate that it is moving.
THE FLAGS IN THE RADIOMETER MOVING?	--respond, "Yes."
DOES IT TAKE TO CAUSE THINGS TO MOVE?	--recall and respond, "Energy."
E IS THE ENERGY COMING FROM?	--recall, "From the light," "I don't know."
HERE ENERGY IN SUNLIGHT?	--respond, "Yes," "No," "Don't know."
COULD WE FIND OUT IF ENERGY FROM SUNLIGHT AKING THE RADIOMETER MOVE?	--suggest shading the instrument.
tudent to shade the radiometer and ask:	
HAPPENED?	--respond that the instrument stopped or that it went slower.
	--infer that because it was shaded, it received no light energy.
HERE ENERGY IN LIGHT?	--infer that there is energy in light.
LANTS NEED LIGHT TO GROW?	--respond, "Yes."
DO YOU THINK PLANTS GET FROM LIGHT?	--respond, "Maybe they get energy from light."
HERE ENERGY IN STARCH?	--respond, "Yes."
THE PART OF THE LEAF THAT WAS IN THE DARK ANY STARCH IN IT?	--respond, "No."
NOT?	--infer that without light the leaf could not have starch.

MATERIALS

TEACHING STRATEGIES

WHAT MUST BE PRESENT FOR STARCH TO BE MADE?

WHAT DOES THE SUN GIVE OFF THAT IS USED BY THE PLANT TO MAKE STARCH?

THEN WHAT IS THERE IN BOTH STARCH AND SUNLIGHT?

WHAT IS ONE THING WE'VE FOUND OUT THAT PLANTS NEED IN ORDER TO MAKE THEIR FOOD?

At this time draw the students' attention to The Living Plant Chart and have them add the information just gained.

Say:

WHERE ON THIS CHART COULD WE RECORD THE INFORMATION WE'VE JUST LEARNED?

WHAT COULD WE WRITE IN THE RECTANGLE?

Appoint or select a volunteer to write this information on the chart in a form similar to that found in Diagram 3-15.

Conclude by asking:

DO YOU THINK PLANTS NEED ANYTHING BESIDES LIGHT TO MAKE FOOD?

Stu

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--s
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TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ST BE PRESENT FOR STARCH TO BE MADE?	Students: --respond, "Light," "Sun."
S THE SUN GIVE OFF THAT IS USED BY THE MAKE STARCH?	--respond, "Energy," "Sunshine."
T IS THERE IN BOTH STARCH AND SUNLIGHT?	--respond, "Energy."
ONE THING WE'VE FOUND OUT THAT PLANTS ORDER TO MAKE THEIR FOOD?	--respond, "Sun," "Light."
draw the students' attention to The Living nd have them add the information just	
THIS CHART COULD WE RECORD THE ION WE'VE JUST LEARNED?	--suggest in the rectangle with the word light in the top.
LD WE WRITE IN THE RECTANGLE?	--suggest, "There was only starch in the part of the leaf in the light," "No starch in the part of the leaf in the dark," "Starch can only be made when the leaf is in the sunlight."
lect a volunteer to write this information in a form similar to that found in Diagram	
sking:	
HINK PLANTS NEED ANYTHING BESIDES LIGHT FOOD?	--speculate and predict. (Do not encourage or reinforce any specific response.)

MATERIALS	TEACHING STRATEGIES
	IN THE NEXT ACTIVITY WE'LL DO SOME MORE EXPERIMENTS TO FIND OUT.

DON'T AS

QUESTI

HERE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
E NEXT ACTIVITY WE'LL DO SOME MORE EXPERIMENTS ND OUT.	

DON'T ASK LEADING QUESTIONS HERE

UNIT III, CORE D
ACTIVITY 3-22: "Sun Spots"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Were your students able to state the purpose of the experiment started in Activity 3-20?
☐ Yes ☐ No: What did you do?

18. Did students' leaves show a striking difference in the amount of starch present in areas exposed to light?
☐ Yes ☐ No: Comment.

19. Were your students able to take pictures and use them to explain this experiment?
☐ Yes ☐ No: Comment.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D
ACTIVITY 3-22: "Sun Spots"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did)
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

5. Determine that without air, plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

MATERIALS

TEACHING STRATEGIES

Activity 3-23. Plants Have An Air About Them

This activity will build on previous activities and establish another factor that plants need to make their food. While growing bean plants from seeds, students inferred that plants need water. In Activity 3-21 the students discovered that plants need light to make food. In this activity, it will be established that the food-making process in plants requires air.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-23. PLANTS HAVE AN AIR ABOUT THEM

OCUS FOR THIS ACTIVITY

OALS:

. Realize and appreciate the energy interrelationships between organisms.

. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES:

. Determine that plants contain food.

. Conclude that plants can make their own food when certain environmental conditions prevail.

. Determine that without air, plants are unable to make food.

. Appreciate the role of green plants in supplying food to the remainder of the living world.

TEACHING STRATEGIES

23. Plants Have An Air About Them

ty will build on previous activities and nother factor that plants need to make their growing bean plants from seeds, students at plants need water. In Activity 3-21 the scovered that plants need light to make food. ivity, it will be established that the food-ess in plants requires air.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have covered a leaf on a growing plant to keep air from reaching the leaf.
--have tested covered and uncovered leaves for starch.
--have inferred that plants require air to manufacture starch.
--have reviewed The Living Plant Chart and recalled that plants need light and water to manufacture food.
--have participated in adding information to the plant chart.

ACTIVITY 3-23

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MATERIALS

*Bean plants (1 plant per team)
*Saran Wrap (other paper will not work)
*String
*Paper
The Living Plant Chart
*Tags for marking leaves
Hot plates
1000 ml Pyrex beaker, 1 per team of students
250 ml Pyrex beaker, 1 per team of students
70% Alcohol
Starch test solution (IKI solution) in Barnes dropping bottles, 1 per student team
Pair of tongs, 1 per student team
Petri dish, 1 per student team
Camera (Polaroid Square Shooter)
Polaroid color film

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Make certain The Living Plant Chart now has the light, soil, and water components filled in.

2. All leaves should remain on the plant until they are to be tested for starch.

Begin this activity by using the Plant Chart to summarize what students have discovered up to this point that plants need to manufacture food. The following points should be discussed.

1. Plants do not eat soil because the soil does not disappear as the plant grows.

2. Although no direct experiment was done to show that plants need water to make food, the need for water in the food-making process should be obvious since water is continually used by the plant and the plant dies without water.

3. Since the part of the leaves in the dark did not have starch present and the part of the leaves in the light did, plants therefore need sunlight to make food.

Begin this summarizing discussion by asking:

WHAT HAVE WE LEARNED SO FAR ABOUT WHAT PLANTS NEED TO MAKE THEIR FOOD?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
ration: ertain The Living Plant Chart now has the soil, and water components filled eves should remain on the plant until they are ested for starch. tivity by using the Plant Chart to summarize have discovered up to this point that plants acture food. The following points should be do not eat soil because the soil does not ar as the plant grows. h no direct experiment was done to show that need water to make food, the need for water food-making process should be obvious since s continually used by the plant and the ies without water. he part of the leaves in the dark did not arch present and the part of the leaves in ht did, plants therefore need sunlight to od. mmarizing discussion by asking: E WE LEARNED SO FAR ABOUT WHAT PLANTS MAKE THEIR FOOD?	Students: --recall previous experiments and chart and include in the response those points listed above, i.e., 1, 2, and 3.

MATERIALS	TEACHING STRATEGIES	St
	After the discussion, continue by asking: DO PLANTS BREATHE? DO YOU THINK PLANTS NEED AIR? WHY? DO YOU THINK THAT A LEAF THAT DIDN'T HAVE ANY AIR WOULD HAVE STARCH IN IT? HOW COULD WE FIND OUT? HOW COULD WE KEEP A LEAF FROM GETTING AIR? CAN YOU THINK OF A WAY THAT WE COULD KEEP AIR FROM REACHING SOME LEAVES? Allow each student to select a leaf on a bean plant and label it with his name on a tag. Then cover the leaf with the airtight covering, Saran Wrap, and loosely tie it around the "leaf stem." The leaf surface must be completely covered, top and bottom, with as little air as possible remaining between the Saran Wrap and leaf surface.	-- -- -- -- -- --
	WORK TIME Select a student to photograph the plant showing the experimental set up. Label and set aside. Do not remove the leaf from the plant.	

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
discussion, continue by asking:	
LANTS BREATHE?	--respond, "Yes," "No," "They must, they need air."
OU THINK PLANTS NEED AIR? WHY?	--suggest that they require oxygen like animals; maybe they require it to make food, maybe they require it in order to live.
OU THINK THAT A LEAF THAT DIDN'T HAVE AIR WOULD HAVE STARCH IN IT?	--respond, "Yes," "No," "Don't know."
COULD WE FIND OUT?	--suggest testing a plant for starch which didn't have any air available.
COULD WE KEEP A LEAF FROM GETTING AIR?	--suggest putting it in a bottle.
OU THINK OF A WAY THAT WE COULD KEEP AIR REACHING SOME LEAVES?	--suggest wrapping leaves in plastic or coating leaves with something.
n student to select a leaf on a bean plant and with his name on a tag. Then cover the leaf with ght covering, Saran Wrap, and loosely tie it e "leaf stem." The leaf surface must be com- vered, top and bottom, with as little air as remaining between the Saran Wrap and leaf surface.	
WORK TIME	
student to photograph the plant showing the tal set up. Label and set aside.	
<u>nove the leaf from the plant</u>.	

MATERIALS

TEACHING STRATEGIES

Place the plants in light for two or three days, watering when necessary. Go on to the next activity while waiting. Then test the leaves for starch, using the strategy from Activity 3-21. Be sure also to test some leaves that were not covered with Saran Wrap as a comparison. Just prior to testing the leaves, review with the students what was done two or three days earlier in preparing the plants for the test.

CAMERA TI

Select a student to photograph leaves immediately after they receive the starch test. Label and set aside for later use. This photo will show the test for the <u>air</u> variable.

WAITING TIME

WORK TIME

Then ask:

DO PLANTS NEED AIR TO MAKE FOOD?

St

--

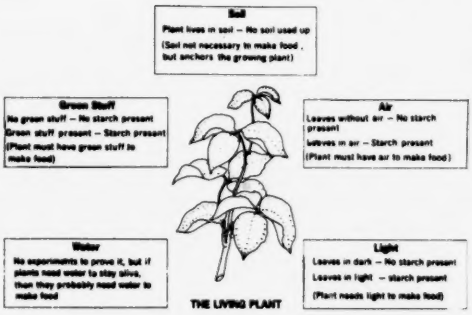
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
nts in light for two or three days, watering y. Go on to the next activity while waiting. leaves for starch, using the strategy from . Be sure also to test some leaves that were ith Saran Wrap as a comparison. Just prior e leaves, review with the students what was hree days earlier in preparing the plants	

ent to photograph leaves immediately after the starch test. Label and set aside for his photo will show the test for the air	

S NEED AIR TO MAKE FOOD?	--infer that plants need air since little starch was found in covered leaves.

MATERIALS

Diagram 3-15



TEACHING STRATEGIES

WOULD PLANTS BE MAKING ANY FOOD IF THEY DIDN'T HAVE AIR?

WOULD PLANTS BE ABLE TO LIVE WITHOUT AIR?

To conclude this activity, complete the section of The Living Plant Chart which pertains to air, emphasizing that since there was little starch in the covered leaf, plants need air for the food-making process. See Diagram 3-15 of the completed chart for suggested wording.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
PLANTS BE MAKING ANY FOOD IF THEY DIDN'T IR?	Students:
PLANTS BE ABLE TO LIVE WITHOUT AIR?	--reply, "No," "Don't think so."
this activity, complete the section of The Chart which pertains to air, emphasizing there was little starch in the covered leaf, air for the food-making process. See Diagram completed chart for suggested wording.	--reply, "No."

UNIT III, CORE D

ACTIVITY 3-23: "Plants Have An Air About Them"

Activity name suggested by class:

Teacher

BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____

MODERATE INTEREST _____

INDIFFERENCE _____

MODERATE RESISTANCE _____

STRONG DISLIKE _____ → _____ _____ _____ _____

HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
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9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Were students confused or uncertain about why they were doing the experiment after the three-day wait? ☐ No ☐ Yes: Comment.

18. Did any of the wrapped leaves show the presence of starch? ☐ No ☐ Yes: What did you do?

19. Did students take pictures and use them to explain this experiment? ☐ Yes ☐ No: Why not?

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D

ACTIVITY 3-23: "Plants Have An Air About Them"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

MATERIALS

TEACHING STRATEGIES

Activity 3-24. The Green Machine

This activity will provide the last component of the answer to the question "What do plants need to make food?" The students will see, through experimentation, that only those parts of the leaf that contain "green stuff" (chlorophyll) produce starch, and therefore conclude that chlorophyll is necessary for photosynthesis to be completed.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-24. THE GREEN MACHINE

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

TEACHING STRATEGIES

-24. The Green Machine

ity will provide the last component of the the question "What do plants need to make e students will see, through experimentation, those parts of the leaf that contain "green lorophyll) produce starch, and therefore hat chlorophyll is necessary for photosynthesis leted.

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have recalled the components of the food-making process explored thus far.
--have sketched a variegated leaf.
--have tested a variegated leaf for starch.
--have concluded that chlorophyll must be present in order for plants to produce food.

ACTIVITY 3-24

MATERIALS

*Variegated (multi-colored) geranium or coleus plant (most florists should have)
*Plain white paper
The Living Plant Chart
*Many varieties of green plants for display use only
Hot plates
1000 ml Pyrex beaker, 1 per team of students
250 ml Pyrex beaker, 1 per team of students
70% Alcohol
Starch test solution (IKI solution) in Barnes dropping bottles, one per student team
Pair of tongs, 1 per student team
Petri dish, 1 per student team

*Not furnished in materials kit

TEACHING STRATEGIES

Teacher Preparation:

1. Direct students to save the "green water" from the starch tests for use later in this activity.

2. A variegated geranium that shows a white leaf margin is a more reliable plant to use for the tests in this activity; a coleus plant may be used as a substitute, however, if the leaves have deep red centers and if it is a mature plant.

Begin by displaying The Living Plant Chart and asking:

WHAT HAVE WE BEEN TRYING TO FIND OUT THROUGH OUR LEAF EXPERIMENTS THE PAST WEEK?

Point to the chart and ask:

SO FAR, WHAT THINGS HAVE WE LEARNED PLANTS NEED TO MAKE FOOD?

The following points should be included in the discussion:

1. Plants do not eat soil because the soil does not disappear as the plant grows.

2. Although no direct experiment was done to show that plants need water to make food, since plants need water to grow they must need water to make food.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
aration: students to save the "green water" from the tests for use later in this activity. egated geranium that shows a white leaf is a more reliable plant to use for the n this activity; a coleus plant may be a substitute, however, if the leaves ep red centers and if it is a mature	Students:
laying The Living Plant Chart and asking: E WE BEEN TRYING TO FIND OUT THROUGH OUR ERIMENTS THE PAST WEEK?	--recall beginning of core and respond, "How plants make food," "Where plants get their food."
chart and ask: WHAT THINGS HAVE WE LEARNED PLANTS MAKE FOOD?	--examine and study The Living Plant Chart and recall light, air, and water.
points should be included in the discussion: do not eat soil because the soil does not ar as the plant grows. h no direct experiment was done to show ants need water to make food, since plants ter to grow they must need water to make	

MATERIALS	TEACHING STRATEGIES
	3. Since leaves in the dark had no starch present when tested and leaves in the light did, plants therefore need sunlight to make food. 4. Since leaves covered with wrap showed little starch present and uncovered leaves clearly showed starch present, air must be necessary for the food-making process of plants. Continue by showing the students various types of green plants. Say: WHAT DO ALL THESE PLANTS HAVE IN COMMON? ONE OF THE THINGS YOU MENTIONED THAT WAS THE SAME ABOUT ALL PLANTS IS THAT SOME PART OF EACH PLANT IS GREEN. WHY DO YOU SUPPOSE PLANTS ARE GREEN? WHAT DO WE CALL THIS "GREEN STUFF?" Write "chlorophyll" on the board. Discuss all responses. If students suggest that the chlorophyll has something to do with food, ask them how they might test that idea. If not, ask: DO YOU SUPPOSE PLANTS COULD LIVE IF THEY WERE NOT GREEN?

DON'T ASK QUESTI

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
ce leaves in the dark had no starch present n tested and leaves in the light did, plants efore need sunlight to make food.	
ce leaves covered with wrap showed little starch sent and uncovered leaves clearly showed starch sent, air must be necessary for the food-making cess of plants.	
by showing the students various types of green Say:	
DO ALL THESE PLANTS HAVE IN COMMON?	--suggest that they all have leaves, grow in dirt, need water, have a stem, are in a pot, are green.
DON'T ASK LEADING QUESTIONS HERE	
F THE THINGS YOU MENTIONED THAT WAS THE SAME ALL PLANTS IS THAT SOME PART OF EACH PLANT REEN.	
O YOU SUPPOSE PLANTS ARE GREEN?	--respond, "Because they have that "green stuff" in them."
DO WE CALL THIS "GREEN STUFF?"	--respond, "Chlorophyll."
orophyll" on the board.	
l responses. If students suggest that the l has something to do with food, ask them ight test that idea. If not, ask:	
U SUPPOSE PLANTS COULD LIVE IF THEY WERE REEN?	--respond, "Don't know," "Maybe," "Sure, I know some that are not green."

MATERIALS

TEACHING STRATEGIES

IF A LEAF IS NOT GREEN DO YOU THINK IT WOULD HAVE ANY STARCH IN IT?

Display variegated plant and ask:

HOW IS THIS PLANT DIFFERENT FROM THE PLANTS THAT WE USED IN EARLIER ACTIVITIES?

WHY IS PART OF THE LEAF WHITE?

DO YOU SUPPOSE THAT THIS PLANT HAS STARCH IN IT?

DO YOU THINK THAT THE WHOLE LEAF WILL HAVE STARCH IN IT?

HOW COULD WE FIND OUT?

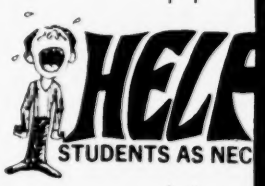
Distribute a leaf to each student.

BEFORE WE DO THE STARCH TEST, DRAW A PICTURE OF YOUR LEAF AND LABEL THE GREEN AND WHITE PARTS SO THAT YOU CAN REMEMBER WHAT PART WAS GREEN AND WHAT PART WAS WHITE.

WORK TIME

As an alternative to drawing, you may wish to permit one or two students to take a picture of the leaf. Mount it on paper and label it to identify the green and white parts. Take another picture after the starch test is made. These two pictures will illustrate the importance of *chlorophyll*.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
F IS NOT GREEN DO YOU THINK IT WOULD STARCH IN IT?	--respond, "Yes, because they had starch in them after we took the green out."
gated plant and ask:	
HIS PLANT DIFFERENT FROM THE PLANTS THAT IN EARLIER ACTIVITIES?	--observe that the leaves have white edges.
ART OF THE LEAF WHITE?	--infer that it must not have any chlorophyll in it.
UPPOSE THAT THIS PLANT HAS STARCH IN IT?	--predict, "Yes," "Probably," "The others did."
HINK THAT THE WHOLE LEAF WILL HAVE N IT?	--predict, "Yes," "No," "Maybe."
D WE FIND OUT?	--suggest testing the leaf with the starch test solution.
leaf to each student.	
E DO THE STARCH TEST, DRAW A PICTURE OF F AND LABEL THE GREEN AND WHITE PARTS YOU CAN REMEMBER WHAT PART WAS GREEN PART WAS WHITE.	--sketch a leaf.
WORK TIME	
tive to drawing, you may wish to permit one ts to take a picture of the leaf. Mount it on el it to identify the green and white parts. picture after the starch test is made. tures will illustrate the importance of	

MATERIALS	TEACHING STRATEGIES	
		St
	Instruct students to perform the starch test as in the previous activity.	
	When all have completed the test, say:	
	WHAT DID YOU FIND?	--
	WHY DO YOU SUPPOSE THERE IS STARCH ONLY WHERE THE LEAF IS GREEN?	--
	At this time add to The Living Plant Chart the information just collected. Point to the chlorophyll part and ask:	
	WHAT COULD WE PUT ON OUR CHART THAT WOULD TELL US WHAT CHLOROPHYLL HAS TO DO WITH THE PLANT?	--
		

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
HELP STUDENTS AS NECESSARY	
students to perform the starch test as in the activity.	
WORK TIME	
have completed the test, say:	
DID YOU FIND?	--relate that starch was found only where the leaf was green.
DO YOU SUPPOSE THERE IS STARCH ONLY WHERE LEAF IS GREEN?	--responses will vary; may suggest that chlorophyll is necessary for the plant to make starch.
ime add to The Living Plant Chart the information ected. Point to the chlorophyll part and ask:	
COULD WE PUT ON OUR CHART THAT WOULD TELL HAT CHLOROPHYLL HAS TO DO WITH THE PLANT?	--suggest, "It has to be green to make food," "Starch is only in the green part."
HELP STUDENTS AS NECESSARY	

MATERIALS

TEACHING STRATEGIES

Appoint or select a volunteer to write this information on the chart referring to the completed chart in Diagram 3-15 for suggested wording. At the same time have one or two selected students arrange a display of all the pictures showing what plants need to make food. Be sure they are arranged in the following sequence: Air + Water + Light + Chlorophyll→Plant Food.

OUR PHOTOGRAPHS ARE DISPLAYED, OUR CHART IS ALL FILLED IN, AND WE HAVE THE INFORMATION WE NEED. WHAT DID WE FIND THAT PLANTS NEED TO MAKE FOOD?

It might help us to remember these things if we wrote it down a special way.

Write:

AIR + WATER + LIGHT + CHLOROPHYLL→PLANT FOOD

LET'S REVIEW SOME OF THE THINGS WE'VE TALKED ABOUT IN CLASS THESE PAST FEW WEEKS. I'M GOING TO ASK YOU SOME QUESTIONS. PLEASE RAISE YOUR HAND TO ANSWER.

IS WATER A FOOD? HOW MANY THINK IT IS?

Record names of students who raise their hands on Tallysheet 3-11 included at the end of this activity.

IS LIGHT A FOOD? HOW MANY THINK IT IS?

Record names on Tallysheet 3-11.

IS AIR A FOOD? HOW MANY THINK IT IS?

Record names on Tallysheet 3-11.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students:
or select a volunteer to write this information hart referring to the completed chart in Diagram suggested wording. At the same time have one or cted students arrange a display of all the pictures what plants need to make food. Be sure they are in the following sequence: Air + Water + Light + yll→Plant Food.	
PHOTOGRAPHS ARE DISPLAYED, OUR CHART IS FILLED IN, AND WE HAVE THE INFORMATION NEED. WHAT DID WE FIND THAT PLANTS NEED MAKE FOOD?	--recall, "Air," "Water," "Light," "Chlorophyll."
help us to remember these things if we wrote a special way.	
+ WATER + LIGHT + CHLOROPHYLL→PLANT FOOD	
S REVIEW SOME OF THE THINGS WE'VE TALKED UT IN CLASS THESE PAST FEW WEEKS. I'M G TO ASK YOU SOME QUESTIONS. PLEASE RAISE R HAND TO ANSWER.	
VATER A FOOD? HOW MANY THINK IT IS?	--raise hands.
mes of students who raise their hands on et 3-11 included at the end of this activity.	
LIGHT A FOOD? HOW MANY THINK IT IS?	--raise hands.
mes on Tallysheet 3-11.	
AIR A FOOD? HOW MANY THINK IT IS?	--raise hands.
mes on Tallysheet 3-11.	

MATERIALS	TEACHING STRATEGIES
	IS SOIL A FOOD? HOW MANY THINK IT IS? Record names on Tallysheet 3-11. If more than a few students raised their hands in response to these questions, review, before proceeding, the food = energy concept, and the concept that since air, light, water and soil do not give energy they are not foods. Then ask the questions above once more. WHERE DO PLANTS GET THE ENERGY TO MAKE FOOD? IF YOU TRACE EVERY FOOD CHAIN BACK TO THE FIRST THING IN IT, WHAT WOULD IT BE? WHAT MAKES FOOD FROM AIR, WATER, LIGHT, AND CHLOROPHYLL FOR LIVING THINGS ON EARTH? Finally go to the chalkboard and write: HAVE YOU THANKED A GREEN PLANT TODAY? Ask students to explain what this bumper sticker slogan means. Allow discussion of their interpretations. Use this as a clue to their understanding and appreciation of the previous activities.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
A FOOD? HOW MANY THINK IT IS?	Students:
on Tallysheet 3-11.	--raise hands.
a few students raised their hands in response stions, review, before proceeding, the food = pt, and the concept that since air, light, il do not give energy they are not foods. questions above once more.	
O PLANTS GET THE ENERGY TO MAKE FOOD?	--respond, "From the sun."
TRACE EVERY FOOD CHAIN BACK TO THE FIRST N IT, WHAT WOULD IT BE?	--respond, "Plants," "The sun."
KES FOOD FROM AIR, WATER, LIGHT, AND HYLL FOR LIVING THINGS ON EARTH?	--respond, "Green plants."
o the chalkboard and write:	
U THANKED A GREEN PLANT TODAY?	
to explain what this bumper sticker slogan w discussion of their interpretations. Use ue to their understanding and appreciation of activities.	

Teacher _____

Date _____

UNIT III, CORE D

TALLYSHEET 3-11: Tally of Student Answers to Oral Questions

ACTIVITY 3-24: "The Green Machine"

1. As you ask students in the last part of Activity 3-24 to raise their hands if they think water, light, air, or soil are a food for plants, make a check in the appropriate column for each student who thinks one or more of these is a food.

2. Retain and use the other side of this tallysheet to summarize Worksheet 3-20 in Activity 3-25.

		1 Is Water A Food?		2 Is Light A Food?		3 Is Air A Food?		4 Is Soil A Food?	
		Yes	No	Yes	No	Yes	No	Yes	No
Attach ID list here.	01								

Attach ID list here.	01							
TOTALS:								

TALLYSHEET 3-11: Tally of Worksheet 3-20

Circle each item the student marked on his worksheet. Then total the number of correct responses for each student and the number of students correctly responding to each item. Consider whether the whole group needs further review of particular concepts or if some students need additional help.

		1	2	3	4	5	6	7	8	9	10	Bottom left				Total Correct
	KEY:	1	2	3	4	5	6	7	8	9	10	A	B	C	D	
Attach ID list here.	01	1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	
		1	2	3	4	5	6	7	8	9	10	A	B	C	D	

1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
1	2	3	4	5	6	7	8	9	10	A	B	C	D	_____
		3		5	6		8	9	10			C		
TOTAL ANSWERING CORRECTLY		___		___	___		___	___	___			___		

Does this review give an accurate indication of student understanding? ☐ Yes ☐ No

If not, what other evidence do you have of student learning?

UNIT III, CORE D
ACTIVITY 3-24: "The Green Machine"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Please record student answers on Tallysheet 3-11 to the questions of whether water, light, air, or soil are foods. Retain the tallysheet to use in Activity 3-25.

18. Have a student take pictures of the completed Living Plant Chart and of their display of the experiment photographs and send them in with this worksheet.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D
ACTIVITY 3-24: "The Green Machine"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

Me and my Environment

OBJECTIVE FOCUS FOR THIS ACTIVITY

UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

CORE D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

3. Infer that the sun provides the energy upon which man and other life depends.

4. Determine that in the absence of light, plants are unable to make food.

5. Determine that without air, plants are unable to make food.

6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

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ACT

MATERIALS

TEACHING STRATEGIES

Activity 3-25. Review Of Success

The eleven questions in this review of success check on students' understanding of the importance of plants as well as the ability to read a graph. Discussion of these

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UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS

BSCS

ACTIVITY 3-25. REVIEW OF SUCCESS

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

2. Appreciate and understand man's dependence on green plants for food.

D OBJECTIVES:

1. Determine that plants contain food.

2. Conclude that plants can make their own food when certain environmental conditions prevail.

3. Infer that the sun provides the energy upon which man and other life depends.

4. Determine that in the absence of light, plants are unable to make food.

5. Determine that without air, plants are unable to make food.

6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.

7. Appreciate the role of green plants in supplying food to the remainder of the living world.

TEACHING STRATEGIES

25. Review Of Success

questions in this review of success check on nderstanding of the importance of plants as ability to read a graph. Discussion of these

ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

--have answered each of the questions on Worksheet 3-20.

ACTIVITY 3-25

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MATERIALS

Worksheet 3-20
Slides 3-41 and 3-42
*35mm Slide projector

Slide 3-41

Date _____ Name _____

PLACE AN X IN THE BLANK IN FRONT OF ANY STATEMENT THAT IS TRUE ABOUT PLANTS.

_____ 1. PLANTS GET THEIR ENERGY FROM THE SOIL.

_____ 2. PLANTS GET THEIR ENERGY FROM WATER.

_____ 3. PLANTS USE ENERGY FROM SUNLIGHT.

_____ 4. PLANTS DON'T NEED ANY FOOD.

_____ 5. PLANTS MAKE THEIR OWN FOOD.

_____ 6. PLANTS NEED SOMETHING FROM THE AIR TO GROW.

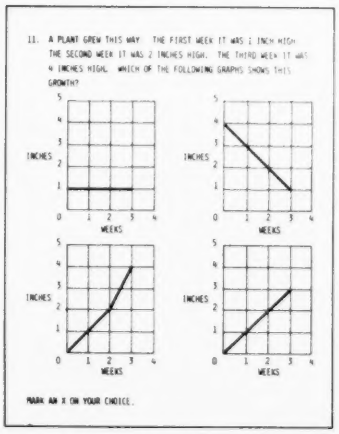
_____ 7. PLANTS IN THE DARK CAN MAKE THEIR OWN FOOD.

_____ 8. PLANTS NEED WATER TO LIVE.

_____ 9. ANIMALS WOULD DIE IF THERE WERE NO PLANTS.

_____ 10. PEOPLE WOULD DIE IF THERE WERE NO PLANTS.

Slide 3-42



***Not furnished in materials kit**

TEACHING STRATEGIES

questions provides opportunities for you to provide the students with positive reinforcement and to give assistance to those who need it.

As you distribute Worksheet 3-20 have each student put his name and the date on it.

Say:

> TODAY LET'S THINK ABOUT SOME OF THE THINGS WE HAVE LEARNED ABOUT PLANTS. I WILL HAND OUT A WORKSHEET OF QUESTIONS. AS I READ EACH OF THE QUESTIONS, MARK YOUR OWN ANSWERS BUT DON'T TELL OTHERS WHAT YOU MARK. WE WILL TALK ABOUT YOUR ANSWERS WHEN ALL OF YOU HAVE FINISHED THE WORKSHEET. ARE THERE ANY QUESTIONS?

Project Slide 3-41 and read the instructions. Then say:

> I WILL READ EACH OF THE STATEMENTS ONCE, REPEAT IT A SECOND TIME, AND THEN GIVE YOU TIME TO ANSWER.

Project Slide 3-42 and have students turn their worksheets over. Read the question aloud twice. When all have answered, collect the worksheets. Then project each slide and have the students discuss each answer.

After class, tally the students' answers on Tallysheet 3-11. Use this information in planning to teach Core A of Unit IV, which expands the concepts of food chains and webs to develop the concept of transferring energy and matter through environmental systems.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
provides opportunities for you to provide the with positive reinforcement and to give assistance who need it. stribute Worksheet 3-20 have each student put his the date on it. Y LET'S THINK ABOUT SOME OF THE THINGS AVE LEARNED ABOUT PLANTS. I WILL HAND A WORKSHEET OF QUESTIONS. AS I READ OF THE QUESTIONS, MARK YOUR OWN ANSWERS DON'T TELL OTHERS WHAT YOU MARK. WE TALK ABOUT YOUR ANSWERS WHEN ALL OF HAVE FINISHED THE WORKSHEET. ARE THERE QUESTIONS? ide 3-41 and read the instructions. Then say: LL READ EACH OF THE STATEMENTS ONCE, AT IT A SECOND TIME, AND THEN GIVE YOU TO ANSWER. ide 3-42 and have students turn their s over. Read the question aloud twice. When answered, collect the worksheets. Then project e and have the students discuss each answer. s, tally the students' answers on Tallysheet this information in planning to teach Core A , which expands the concepts of food chains and velop the concept of transferring energy and ough environmental systems.	At the end of this activity, <u>each</u> <u>student</u> should: --have discussed what plants need and their importance. --have discussed graphs and their use.

UNIT III, CORE D
ACTIVITY 3-25: "Review Of Success"

Activity name suggested by class:

Teacher
BSCS USE: Post ____ Tally ____ Rev ____

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: (Number) Name students you noted especially:

HIGH INTEREST _____ → _____ _____ _____ _____
MODERATE INTEREST _____
INDIFFERENCE _____
MODERATE RESISTANCE _____
STRONG DISLIKE _____ → _____ _____ _____ _____
HARD TO RATE _____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	#	#	Game #	Slides (show slide nos.)	Transparency #	#	#	Card(s) #	Tape(s) #	Other #
Worthwhile as is											
Revise slightly											
Revise much											
Worthless: omit											

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed. What parts of this activity should be retained when the curriculum is revised? Page(s) _____:

17. Did any student give away the answer to any question on Worksheet 3-20?
☐ No ☐ Yes: Which?

18. Please tabulate each student's responses on Tallysheet 3-11 and send it in with this feedback sheet.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D
ACTIVITY 3-25: "Review Of Success"

Teacher _____

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

UNIT III
REACTIONS TO CORE D

1. Was the background information for this core adequate? ☐ Yes ☐ No
Comment:

2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No
Comment:

3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No
Comment:

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

SIDE A

BSCS Evaluation: EMH Feedback Form 2a

NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	
		W B S O	M F			W B O	

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name First

W = white
B = black
S = Spanish-American
O = other

W = WISC
B = Binet
O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

te
ck
nish-
rican
er

W = WISC
B = Binet
O = other
(name)

SIDE B